

ROYAL BOTANIC GARDENS, KEW.

BULLETIN
OF
MISCELLANEOUS INFORMATION.

No. 2.]

[1912.

VI.—NOTES ON TREES SUITABLE FOR EXPERIMENTAL FORESTRY.* III. AMERICAN CONIFERS.

W. DALLIMORE.

THE REDWOOD (*Sequoia sempervirens*, Endl.). If free growth and rapid development were the only qualifications necessary to make this tree a success in British forests, it might be planted without further delay, but it remains to be proved whether the timber will be good enough to warrant extensive plantations. The important place occupied by the species in the lumber trade of America, is, however, a sufficient recommendation to warrant it a good trial here.

An idea of its rapid growth in the British Isles may be gathered from the fact that, although it was not introduced before 1846, there are numerous trees between 70 and 110 feet in height, with girths ranging from 8 to 14 feet. As fast growth is quite natural to the tree, there is no reason to suppose that the timber from forest-grown examples would, on that account, be so coarse as that produced by ornamental specimens.

Sequoia sempervirens is a native of California and is found from the northern boundary of the State, southward to the southern boundary of Monterey County, on the mountain slopes and on flat lands near the rivers, where the atmosphere is moist and the temperature fairly equable.

The United States Department of Agriculture, Forestry Section, has published a Bulletin, No. 38, on "The Redwood." It is divided into three parts, i, "A Study of the Redwood"; ii, "The Brown Rot Disease of the Redwood"; iii, "Insect Enemies of the Redwood." In this Bulletin, which is well illustrated, the redwood and its peculiarities are dealt with very fully, and the following notes have been extracted. The tree reaches its greatest size on the flats where the soil is moist and the atmosphere misty. Under such conditions it grows to a height of 350 feet with a diameter of

* The previous articles were published in *K.B.*, 1911, p. 211 and p. 303.

20 feet. On the slopes its maximum height is 225 feet and its greatest diameter 10 feet. Most of the large redwoods are from 400 to 800 years old, but the trees begin to die down and growth falls off after the age of 500 years has been reached. The oldest redwood recorded in the above work showed 1373 annual rings.

The chief requirement of the redwood is moisture at the roots and the nature of the soil appears to be a matter of secondary consideration. According to the Bulletin mentioned above, "moisture available for the roots is the first need of the redwood, as any hilly tract of forest will show. Whenever a small gully, or bench, or basin is so placed as to receive an uncommon amount of seepage, or wherever a creek flows by, there the trees are sure to be largest. Even if the soil be not rich, but merely gravel, and it contains much moisture, the redwood will grow more abundantly there than on richer but drier ground."

Although the redwood may be propagated from seeds, forests are usually replenished by means of sprouts from the old stumps left after felling operations. These sprouts are produced very freely and grow rapidly. Several plates in the Bulletin show how the forest is reproduced by this means. The yield of virgin redwoods under the most favourable conditions is given at from 125,000 to 150,000 cubic feet per acre. In less favoured places it is sometimes as low as 20,000. These figures appear to represent the quantity of timber actually marketed.

Sequoia sempervirens is naturally a light demanding subject, but it is said that trees which have been partly suppressed have the faculty of recovering quickly and growing away again freely as soon as more room and light is given. The wood and its uses are spoken of as follows:—"Redwood possesses qualities which fit it for many uses. In colour it shades from light cherry to dark mahogany: its grain is usually straight, fine, and even; its weight is light; its consistency firm, yet soft. It is easily worked, takes a beautiful polish, and is the most durable of the coniferous woods of California. It resists decay so well that trees which have lain five hundred years in the forest have been sent to the mill and sawed into lumber. The wood is without resin and offers a strong resistance to fire, as is indicated by the record of fires in San Francisco, where it is much used. Insects seldom injure it, because of an acid element its lumber contains. In sea water, however, the marine teredo eats off redwood piling as readily as other timber. Redwood is used for all kinds of finishing and construction lumber, for shingles, railroad ties, electric-light poles, paving blocks, tanks, and pipe staves. It is an excellent wood for all these purposes. As a tie its average life, under heavy traffic, is six to eight years; as shingles it will last as long as 40 years. The chief difficulty in working redwood lies in the seasoning process. The tree absorbs so much moisture that the butt logs will sink in water. Left in the sun, they require three or four years to dry."

Isolated specimens in this country often lose their tops by wind, hence the necessity for forming pure rather than mixed plantations, and planting in valleys rather than on exposed hill sides.

THE DECIDUOUS CYPRESS (*Taxodium distichum*, Rich.).—The many fine examples of this species which are to be found in the British

Isles leads one to suppose that it will prove successful as a forest tree if planted under suitable conditions. Being naturally a moisture-loving subject, it could hardly be expected to thrive under conditions which would suit the Scots pine for instance, but there are many low-lying places where the water is near the surface which would probably provide it with an ideal home. That it is able to grow in water is shown by a tree which has been surrounded by water for several years in the lily pond in the Arboretum at Kew, whilst on Mr. Newdigate's estate near Nuneaton a tree with no soil visible about the base is to be seen growing in the middle of a large lake. Trees perpetually surrounded by water cannot be expected to make such satisfactory progress, however, as those which stand clear of the water, but close enough for the roots to enter. To such trees an occasional flooding is said to cause no inconvenience.

Sargent, "Silva of North America," x. pp. 151-154, gives a description of the species and its peculiarities. The wood is soft, close, straight-grained, not strong, easily worked, and very durable in contact with the soil. Hough, "Elements of Forestry," p. 311, mentions three grades of lumber from this tree known in the timber trade—red, black, and white cypress, differing in the colour of the heartwood. The red and black are most valued, as they are less liable to split than the white. The tree has been described as "one of the great resources of the Southern States," its wood being highly valued for general constructive purposes—railway ties, posts, shingles, cooperage, &c.

It is found from 100 to 150 feet in height and four or five feet in diameter, although trees have occasionally been recorded with a diameter of 11 feet. Though sometimes growing on dry land, it is more frequently confined to low swampy ground in the vicinity of rivers, or to wet hollows amongst forests of other trees. It is distributed from Southern Delaware to Florida and Texas, its largest dimensions being attained towards its more southerly limits.

Fine examples have been recorded from many gardens in the British Isles. These range from 60 to 100 feet in height and from 7 to 13½ feet in girth. Some of them have developed the remarkable knees or upright growths from the roots which are peculiar to the tree when growing in swampy ground in America.

A number of the finest trees about London are to be found at Whitton Park, Hounslow, and Syon House, Brentford. In the former case there are several specimens between 80 and 100 feet in height, the largest one having a girth of 13 feet 7 inches at five feet from the ground. The largest one at Syon is recorded in the "Catalogue of Syon House Trees and Shrubs," 1910, as being 111 feet high and 12 feet in girth. In 1849 it is said that 23 specimens existed there, all of them being more than 50 feet in height.

There can be little doubt that the deciduous cypress is suitable for a pure stand, while it would probably succeed with Sitka spruce in wet but not exposed places. Its narrow fastigate habit when young, suggests that close planting would be necessary.

J. R. Batterden, "Timber," 1908, says that the timber of *Taxodium distichum* finds a place in the English market, and, in describing its uses, remarks that it is largely used for tanks, vats,

and tubs, and that in New Orleans 90,000 fresh-water cisterns are said to be made of the wood; its value for the purpose lies apparently in its durability when kept continually wet.

THE PORT ORFORD CEDAR, LAWSON CYPRESS, OR MATCH-WOOD (*Cupressus Lawsoniana*, A. Murr.).—Several landowners are already trying this species under forest conditions in various parts of the country, with apparently good results, though definite proof of its value for British woodlands is not yet forthcoming. In most places where it has been planted for ornamental purposes, it has given satisfactory results, and has grown rapidly after the first few years, therefore it is reasonable to expect that it will prove suitable for forest culture over a wide area and under many conditions.

Its natural range of distribution is very limited, for it is found in a comparatively small district, lying between Coos Bay in south-eastern Oregon and Klamath river in north-eastern California. In this region, where it extends 30 or 40 miles inland at a low elevation from the coast, the climate is marked by a moderate temperature and a heavy rainfall, with a humid and foggy atmosphere and a large proportion of cloudy days.

Under favourable conditions it attains a height of 200 feet with a diameter of from 6 to 12 feet. Old trees have very thick bark, however, and as much as 18 inches has sometimes to be deducted from the diameter for bark.

Hough, "American Woods," x. No. 241, pp. 41-42, describes the wood as follows:—"Wood light, rather hard and strong, very close grained, easily worked and durable in contact with the soil. It is of a light yellow colour with lighter sap-wood and with a pleasant resinous fragrance. One of the most valuable timbers of N. America in the excellence of its lumber for interior finishing, flooring, boat-building, railway ties, fence posts, etc., and is used extensively in the manufacture of matches. In the last-mentioned use its identity is at once asserted by the characteristic fragrance of the smoke of the burning match. Resin of the wood is a powerful diuretic. This property is so active that workmen in the sawmills, when this lumber is being sawn, are so affected that it becomes necessary occasionally to change to other woods."

The variable character of this species under cultivation necessitates precaution in the selection of seed-bearing trees, those only being selected which are typical of the species and of vigorous and erect habit. By collecting seeds haphazard from a collection of decorative varieties, it is unlikely that the seedlings produced will prove satisfactory when planted under forest conditions.

Elwes and Henry, "Trees of Great Britain and Ireland," v. p. 1207, say that the Lawson cypress has been tried in forest plots at different stations in Prussia, the total area being about 30 acres, and also at Grafrath in Bavaria. After 20 years' experience the wood grown in Germany is found to be as good as that of Oregon. Heartwood is said to begin to form in the tenth year with the characteristic fragrant odour of the timber in America. It is a light-loving tree, and people who have tried it recommend that it should be planted at intervals of three feet.

THE YELLOW CYPRESS (*Cupressus nootkatensis*, Lamb.).—This tree is so highly spoken of by American timber experts, that it

appears to be worth a good trial under forest conditions in this country, especially as it gives good results as an ornamental specimen. It is found on the western coast of N. America, from southern Alaska to Mount Jefferson in Oregon, its best proportions being attained about the coast region of British Columbia, in Vancouver Island and in islands off the coast of Alaska, where it ascends to an elevation of from 2000 to 3000 feet. Further south it reaches an altitude of 4000 to 5000 feet in the Cascade Mountains.

Mature specimens are met with up to 100 feet in height with a diameter of from 5 to 6 feet. Elwes, *l.c.* v. p. 1196, records one on the road from Longmire Springs to Paradise Valley on Mount Rainier, as being 108 feet high and 17 feet 10 inches in girth above a place where it forked at 6 feet from the ground, and 26 feet in girth below the fork. The largest tree recorded in England measured, in 1908, 61 feet in height and 5 feet 7 inches in girth. This had been grown in the open and was well branched and of perfect shape. Several other examples between 50 and 60 feet in height are mentioned. These dimensions may be considered as fairly satisfactory, considering that the species does not grow naturally to a very large size and that the trees in question are probably less than 50 years old, for it is only about 60 years since it was first introduced into Europe, through the medium of the St. Petersburg Botanic Garden, though it was discovered by Menzies half-a-century earlier.

Writing of the wood of this tree in "American Woods," x. No. 240, pp. 39-40, Hough, says:—"It is light but moderately hard and brittle, of exceedingly fine, close grain, with a pleasant resinous odour, easily worked and very durable in contact with the soil. It is of a clear, light yellowish colour, with thin, lighter coloured sap-wood." He also says that for cabinet-making it has few equals and that it is exported to China, where it is used as a substitute for satin-wood.

Elwes, *l.c.*, p. 1197, says:—"Though looked on as an ornamental tree only, my experience of it on poor dry soils justifies me in thinking that if it could be procured at a reasonable cost, it would be one of the most valuable trees for such soils that can be planted; because it is not only absolutely hardy under all conditions in every part of the country, but will thrive where no other tree whose timber at all approaches it in value, except perhaps the larch, will grow to any size. Though a slow grower at first, and not likely to attain in this country the dimensions of *Thuya plicata*, it has all the other good qualities of that tree in an even greater degree." On page 1198 he adds that he has such confidence in the tree that he would plant 10,000 under forest conditions on his estate if he could procure them at a forest tree price. On his estate, where he says the soil is not the best kind for Western American Conifers, he contrasts the growth of the Yellow Cypress with that of the Corsican Pine. Six trees of the *Cupressus* planted in 1876 or 1877 were, at the time he wrote, 35 feet high and 2 feet in girth, uniform in height and habit. Corsican Pines planted close by at the same time averaged 40 feet in height.

No difficulty should be experienced in obtaining American seed of this tree and comparatively young specimens in this country

bear seeds freely. The young trees form plenty of fibrous roots and are not difficult to transplant, up to 3 or 4 years of age. Spaced from 3 to 4 feet apart, it might be tried as a pure stand, or it could be mixed with some light demanding subject, for it does not mind a moderate amount of shade. It is probable that it will succeed in the west of England, Scotland and Ireland, rather than in the east of England on account of the more humid atmosphere in the former places.

A number of common names are applied to the tree in addition to that of Yellow Cypress; some of them are Alaska Cedar, Yellow Cedar, and Sitka Cypress. Its cones are sufficiently distinct to enable anyone to distinguish it from Lawson's Cypress, for the scales are pointed, whilst those of *Cupressus Lawsoniana* are plain. The botanical characteristics of the tree are to be found in Sargent's *Silva* of N. America.

THE WESTERN TAMARACK (*Larix occidentalis*, Nutt.). Attention has been directed to the virtues of this species on several occasions during the last few years, and several importations of seeds have been made with the object of establishing it under forest conditions. The chief reason for inducing people to plant it is the hope that it will prove immune from larch canker and so form a good substitute for common larch in those places where *Larix europaea* is so liable to be crippled by disease as to make it an unprofitable species to plant. From descriptions of the timber of *L. occidentalis* and the uses to which it is put, it appears to be very similar in quality to that of the European species, hence the superiority of one kind over the other depends mainly on the constitution of the two species.

The Western Tamarack occupies the basin of the Upper Columbian River, and is found at a fairly high elevation—2000 to 7000 feet. Its largest dimensions are attained on the bottom lands of northern Montana and Idaho, where it is said to attain sometimes a height of 250 feet with a diameter of six or eight feet. On slopes of hills and on mountain sides it is much smaller, though it gives satisfactory results even when growing in poor sandy soil.

Hough, "American Woods," x. No. 250, pp. 52-53, says that the wood is heavy, hard, strong, close-grained, with few resin passages, very durable in contact with the soil, and susceptible of a very smooth polish. It is of a rich, orange-brown colour, with thin brownish-white sap-wood. He describes it as one of the most valuable of the coniferous woods of the continent, and as being used for furniture, doors, interior finishing, railway ties, fence posts, &c. Specimens of the wood may be seen in Museum No. 3, at Kew, also a specimen of resin which is collected and eaten by the natives. Hough mentions this resin, and says that it is sweetish, resembling dextrose in properties, and exudes in abundance.

No large trees of *L. occidentalis* appear to exist in this country. At Kew there are a number of trees, 30 to 38 feet high. These are growing with European larch of a similar age, about 30 years, and there is little to choose between the development of the two species. Elwes and Henry, "Trees of Great Britain and Ireland," ii. pp. 395-402, say that a good seed year occurs in America every two or three years. The cones open and liberate the seeds in

September, therefore it is necessary for collectors of seeds to be at work during the first three weeks of that month. There appears to be some difficulty in obtaining seeds through the usual channels, and most of the importations which have been made were by private enterprise. Though the trees at Kew bear cones freely, they invariably fail to perfect their seeds.

L. occidentalis could be tried either as a pure plantation or as a mixture in the same way as the common larch. The latter method of culture would probably be the more successful one.

THE WESTERN HEMLOCK SPRUCE (*Tsuga Mertensiana*, Carr.). This appears to be the most suitable of the several N. American hemlock spruces for trying under forest conditions in the British Isles for in America it grows to a larger size and produces better timber than *T. canadensis*, Carr., the hemlock spruce of N. E. America, and is hardier than the mountain hemlock, *T. Pattoniana*, Engelm. of California.

Its distribution extends from South-eastern Alaska to San Francisco. It is said to be most abundant in Washington. Oregon and British Columbia; its largest proportions being attained in the humid atmosphere of the coast region from sea level to an altitude of 2000 feet. Where the more favourable conditions prevail, it sometimes attains a height of 200 feet with a girth of 10 feet. Hough says that towards the more northerly parts of its habitat it grows to a larger size than any other forest tree, and he also describes it as the largest representative of the genus.

The wood is described as "light, rather hard, tough, close-grained, susceptible of a good polish, of a pale, yellowish-brown colour with lighter sap-wood" (Hough, American Woods, ix. No. 223, pp. 50-51). It is said to be easily worked, stronger and more durable than eastern hemlock, and to be used to a considerable extent for house-building and general construction purposes, though it suffers to some extent on account of the bad reputation the eastern species has obtained for coarseness. In addition to the timber being valuable for lumber, it makes good pulp for paper-making, and the bark is rich in tannin. The bark has been used by the North American Indians for making into a coarse kind of bread. A specimen of this bread is to be seen in Museum No. 3 at Kew, and an account of the nutritive character of the bark may be found in Sargent's "Silva of North America," xi. p. 93.

The species grows well as an ornamental specimen in many parts of the British Isles, and it is being tried as a forest tree in a few places. In the "Transactions of the Royal Scottish Aboricultural Society," xx. 1907, pp. 101-2, there is a Report on "Experimental Plots at Novar," by Clive Marriott, and *T. Mertensiana* is one of the trees dealt with. Two plots, each one acre in extent, had been planted, one with the hemlock spruce and larch in equal proportions, and the other with pure hemlock spruce. In neither case had the *Tsuga* done well except where a certain amount of shelter was afforded, and the opinion expressed was, that it ought only to be planted in those places where it can have a considerable amount of protection. Compared with Douglas fir grown on another plot, it was a decidedly inferior tree. The plots had been planted from three to five years when the report was drawn up.

THE NOBLE FIR OR OREGON LARCH (*Abies nobilis*, Lindl.).—The noble proportions assumed by this tree in its native country, together with its decorative qualities, have led to its being planted very widely in British gardens. Unfortunately, in many parts of the country, more particularly in the south of England, it is attacked by an aphid, *Chermes abietis*, which causes ugly warty excrescences to appear on the branches. This pest prevents proper development and ultimately kills the tree. Another disease is also prevalent, especially amongst small plants. In this case the irritation set up by a minute insect causes thick gouty swellings on the branches which check growth, and though an affected tree may live many years, it is always an unsightly object, and eventually dies. In Scotland these diseases do not appear to be so common, and on many estates they have not been found; the trees are making rapid progress and promise to provide a good bulk of timber in a comparatively short time.

The species is found from North Washington to a position south of the McKenzie River in Oregon, its largest proportions being attained on the mountains of north-western Oregon at an altitude of from 2000 to 5000 feet. The finest examples are from 250 to 275 feet high, with a diameter of from six to eight feet. Hough, "American Woods," ix. No. 225, pp. 52–54, describes the wood as light, strong, rather hard, close-grained, of a light yellowish-brown colour, with lighter sap-wood. It is used for the interior finish of houses, boxes, &c. The following description of the tree from which Hough's wood sections were taken is given in the work mentioned above. "Height 254 feet, lowest branch 176 feet from the ground; diameter of trunk four feet from the ground, 63 inches. The trunk was as clear and shapely as a mast, and from it eight logs, 16 feet long, and one 32 feet long were cut. The upper end of the topmost log (160 feet from the ground) was 35 inches in diameter, and just above this the material for the wood sections was cut." He further adds, that "the nine logs were eventually cut into 18,142 feet of magnificent clear lumber."

On the Ardverrick estate of Sir John Ramsden, in Inverness-shire, *Abies nobilis* is the most vigorous of the several kinds of conifers grown. It is quite free from disease, and is looked on as likely to become one of the most useful forest trees for the neighbourhood. A large number of trees have been planted, the majority at an altitude of 800 to 1200 feet. Many trees are from 20 to 40 feet in height. The average rate of growth of trees growing at an elevation of 1200 feet for a period of 30 years is said to have been 15 inches. (See account of Ardverrick estate, *Kew Bull.* 1910, pp. 243–246).

THE GREAT SILVER FIR (*Abies grandis*, Lindl.). There appears to be a disposition to plant this tree under forest conditions in various parts of Scotland, and if freedom of growth were the only object in view, there would appear to be good cause for its selection. Unfortunately its timber finds less favour with American consumers than that of several other Conifers from Western N. America, hence the undesirability of forming plantations in places where more profitable kinds might be grown. It is, however, worth including in an experimental area, and the chances are that it may

turn out to be as good as some of the other firs. Descriptions of the species record examples up to 300 feet in height, and 4 to 6 feet in diameter, rising with straight clean, columnar trunks to two-thirds of their height, without a branch. Hough, ix. No. 224, p. 51-52, writes of the wood as follows:—"Wood very light, soft, not strong or durable, coarse-grained, easily worked and yielding a very smooth satiny surface. Light yellowish-brown colour, lighter sapwood. The wood of this tree is occasionally manufactured into lumber for interior finishing, boxes, casks, &c., but hitherto has been little valued as compared with the Douglas spruce, giant cedar, &c."

THE WHITE FIR (*Abies concolor*, Lindl. & Gord.). The handsome, pyramidal outline of this tree, together with its more or less glaucous foliage, make it popular for ornamental planting, whilst its free growth and comparative freedom from disease, suggest that it may be employed profitably for forest planting, for although the timber is of less consequence than that of several other trees from Western North America, it is of sufficient value to warrant the tree a trial.

The species is described in Sargent's "Silva of North America," xii. pp. 121-124. From that description it would appear that the tree attains its maximum dimensions in certain parts of California where it rises to a height of between 200 and 250 feet with a diameter of 6 feet, but elsewhere it is rarely seen more than 125 feet high and 3 feet in diameter. It covers a wide range of country from Southern Oregon to Colorado and New Mexico, and is most frequently met with in moist valleys at an elevation of from 3000 to 9000 feet.

Its timber does not appear to be exported, though it is used rather largely in the Western States for the manufacture of butter-tubs, boxes, packing-cases, &c., which must be made from scentless wood. It is described by Hough as very light, soft, not strong, coarse-grained, compact, and of a light, buff-brown colour, with sapwood scarcely distinguishable.

Writing of this tree Sargent says:—"Growing here [Boston] during the last 25 years always vigorously, compact in habit, beautiful in its various shades of blue, and free from disease and the attacks of disfiguring insects, *Abies concolor* is now more full of promise as an ornament of the parks of eastern America than any other fir tree." These words may also be said to describe the opinion formed of the tree in this country, but it remains to be seen how it will succeed under forest conditions. With it may be included the allied species *A. Lowiana*, *A. Murr.*

THE SITKA OR TIDELAND SPRUCE (*Picea sitchensis*, Trautv. & Mey.).—A great deal of attention has been directed to this tree during the last few years by both British and continental foresters, for it is found to thrive under conditions which are unsatisfactory for the proper development of the common spruce. In cold situations, where the land is wet, young trees are growing well, whereas common spruce under similar conditions has proved a failure. Here and there about the country, more particularly in Scotland, well developed specimens are to be seen, which show that it is not only in a young state that the species is a success. On the

Achnacarry estate in Inverness-shire a tree was noted in 1910 which was 98 feet high and 8 feet 8 inches in girth at 5 feet above the ground. It was possible to compare this tree with a specimen of Douglas fir near by. The latter was apparently the same height, but was 2 inches larger in girth. Both trees were planted in 1865. A small plantation of this species growing under very favourable conditions in Cornwall, was noted a few years ago. Many of the trees had formed leads from 5 to 5½ feet in length as the result of one season's growth. As a contrast to this, young trees planted on boggy land, at an elevation of 800 to 1400 feet in Inverness-shire formed leading shoots, the second year after planting, from 9 to 12 inches in length.

Sargent, in his description of the Sitka spruce in the "Silva," xii. pp. 55-58, says "no tree in the American forest grows with greater vigour or shows stronger evidence of vitality." He also refers to it as "the greatest of all spruce trees," though it does not do well in the Eastern United States.

P. sitchensis occupies an extensive range of country along the Pacific coast, for it occurs from a northerly point in Alaska to Mendocino county in California. It is most abundant and reaches its largest proportions in rich, moist soil in Western Oregon and Washington. In some places it occurs as extensive and almost pure forests, on swampy ground about the mouths of rivers where the influence of the tide is felt. Elsewhere it may be mixed with other trees but either as pure or mixed forest it is common throughout the coastal region. Sargent gives its average height as 100 feet with a diameter of 3 or 4 feet, though he says that it is occasionally met with over 200 feet high with a trunk 15 or 16 feet in diameter, and in its extreme north-western limits, as a low shrub. The timber is of very good quality and is useful for a variety of purposes. Hough, "American Woods," vi, No. 149, pp. 54-55, describes it as "light, soft, strong, with close, straight grain, compact, with satiny lustre, differing from other spruce wood by its dark heart-wood." Amongst other uses, it is employed for general interior finishing, fencing, boat-building, general constructive purposes, cooperage, and wood pulp.

Owing to its partiality for wet places it is probable that it would prove most satisfactory as a pure stand, though where a mild climate prevails a mixture of this tree and deciduous cypress might prove a good combination.

Although the two following species are being planted to some extent, it is very doubtful whether they will ever be of any commercial value in this country.

THE WHITE SPRUCE (*Picea alba*, Link.).—In both England and Scotland an effort is being made to introduce this species as a forest tree, the idea being that it will prove a success in exposed situations where many kinds of trees have little chance. It would, however, be wise to carry on a certain amount of planting of an experimental character before launching out on any great expenditure, in face of the fact that it has not proved to be a very satisfactory ornamental tree in this country, and that, with a few exceptions, the trees of Eastern North America are more difficult

to cultivate successfully in Britain than those from the western side of the continent. Its great hardiness is the principal point in its favour, but it is quite probable that more remunerative trees can be grown quite as well, if not better, than the white spruce up to an altitude at which a paying forest would cease in this country. As a shelter belt for some other tree, it is doubtful whether it would prove a general success on account of its slow growth, therefore there is little that can be advanced in its favour.

Forbes, "Development of British Forestry," p. 119, however, gives an illustration of some nice trees growing at an elevation of 1500 feet in the Pennines.

THE NORTHERN SCRUB PINE (*Pinus Banksiana*, Lamb.).—On some estates in Scotland the cultivation of this pine under forest conditions has been commenced, but it is very doubtful whether it will ever be of any commercial value. At its best it is a scrub pine, and little can be said in its favour except that it is very hardy, and that it might form cover or shelter at a high elevation where little else would grow. Even then it is probable that *P. montana* var. *uncinata* would prove to be the better tree.

VII.—THE GENUS NAUTILCALYX.

T. A. SPRAGUE.

Living plants of three obviously congeneric species of *Gesneriaceae* were presented to Kew in 1910 by Messrs. Sander & Sons, St. Albans, for whom they had been collected by Mr. Forget in Peru. One of them flowered in the same year, and was found to be an undescribed species closely allied to *Alloplectus Lynchii*, Hook. fil. (Bot. Mag. t. 7271). As the latter, however, seemed very different from any previously described *Alloplectus*, a further search was made, with the result that several closely allied species were found in the genus *Episcia*: among these were *E. bractescens*, Hanst. (*Centrosolenia bractescens*, Hook. Bot. Mag. t. 4675) and *E. hirtiflora*, Spruce. *E. bractescens* (*Nautilocalyx hastatus*, Linden) is the type and sole species of *Episcia*, section *Nautilocalyx*, Benth. & Hook. fil. (Gen. Plant. vol. ii. p. 1007). It differs from the other species mentioned above in the large bracts, and in the anticus and lateral calyx segments being connate below, but agrees in other technical characters, and has the same facies. It seemed desirable, therefore, to widen the definition of the section *Nautilocalyx* by excluding the two characters peculiar to the type species, so as to admit *Alloplectus Lynchii*, *Episcia hirtiflora* and their allies.

The question next arose as to whether *Nautilocalyx* should be retained as a section of *Episcia*, transferred to *Alloplectus*, or treated as a distinct genus. A preliminary investigation soon showed that *Alloplectus* and *Episcia* were ill-defined, and that until their distinguishing characters were better understood it would be premature to revive the genus *Nautilocalyx*. On account of the nature of the placentation (see below), it was decided to transfer

the section *Nautilocalyx* provisionally to *Alloplectus*; and the three species received from Messrs. Sander & Sons were accordingly described under the names *Alloplectus (Nautilocalyx) Forgetii*, *A. pallidus* and *A. hirsutus* (Kew Bull. 1910, p. 383; 1911, p. 346). The result of a further investigation is now given.

The genera *Episcia* and *Alloplectus* were distinguished from each other in Benth. & Hook. f., Gen. Plant. vol. ii. 1876, p. 993, key to the genera, by the filaments, which were stated to be free from one another in the former, and united into a posticously split sheath in the latter; on p. 1006, however, they were described as more or less connate at the base in *Episcia*. In the original description of *Episcia* (Martius, Nov. Gen. et Sp. Pl. vol. iii. 1829, p. 39) the filaments were stated to be subulate, and inserted at the very base of the corolla, and they were figured as free from one another in *E. reptans* (t. 217). Hanstein, however, in his conspectus of the genera of *Gesneriaceae* (Linnaea, vol. xxvi. 1853, pp. 206-207) was doubtful as to whether the filaments were not united at the base, and eleven years later he definitely described them as united at the base among themselves and with the base of the corolla, as in *Alloplectus* (Martius, Fl. Bras. vol. viii. pars 1, 1864, p. 401). This has been confirmed by the writer.

The distinction based on the filaments having been found to be illusive, the descriptions of *Episcia* and *Alloplectus* given in Linnaea, vol. xxxiv. pp. 233, 234, 246, 247, the Flora Brasiliensis, the Genera Plantarum and the Nat. Pflanzenfamilien were compared, in order to ascertain in what characters the two genera differed. According to these, *Episcia* includes herbs with usually narrow calyx segments, and a thin infundibular corolla with a limb more than twice as much in diameter as the tube; and *Alloplectus* is composed of shrubs and undershrubs with broad calyx segments, and a somewhat fleshy subcylindric corolla with a limb which is either narrower or not much broader than the tube.

Inspection of the specimens of *Episcia* in the Kew herbarium suggested that that genus, as defined by Hanstein (Linnaea, vol. xxxiv. p. 246), Bentham and Hooker, and Fritsch (Engl. and Prantl, Nat. Pflanz. vol. iv. 3b, p. 166), included several discordant elements which made it impossible to define the genus satisfactorily. As a first step towards segregation, a careful comparison was made between typical species of *Episcia* and *Alloplectus*. Following Hanstein (Linnaea, vol. xxvi. pp. 206, 207), *Episcia reptans*, Mart. (Nov. Gen. et Sp. Pl. vol. iii. p. 41, t. 217) was taken as the type of *Episcia*, in preference to *E. decumbens*, Mart. *Alloplectus sparsiflorus*, Mart. (l.c. 55, t. 223, l. figs. 1-8) was selected as the typical species of its genus, on account of the excellent coloured figure.

On carefully comparing the figures of *Episcia reptans* and *Alloplectus sparsiflorus*, it was noticed that the placental lamellae bore ovules on both surfaces in the former, and on the inner surface only in the latter. If the presence of ovules on both surfaces of the placental lamellae be accepted as characteristic of *Episcia*, the genus can be restricted to the section *Cyrtodeira (Euepiscia)*, Benth. & Hook. f., including the following species: *E. reptans*, Mart. (Nov. Gen. et Sp. vol. iii. t. 217), *E. cupreata*, Hanst. (Bot. Mag.

t. 4312), *E. splendens*, Hanst. (Bot. Mag. t. 5195), *E. chontalensis*, Hook. f. (Bot. Mag. t. 5925), *E. fulgida*, Hook. f. (Bot. Mag. t. 6136), and *E. Fendleriana*, Kuntze.

This leaves the genera *Physodeira*, Hanst., *Alsobia*, Hanst., *Skiophila*, Hanst., *Centrosolenia*, Benth., *Paradrymonia*, Hanst., *Trichodrymonia*, Oerst., and *Nautilocalyx*, Linden, (which are included under *Episcia* in the Genera Plantarum) to be accounted for. All these have ovules on the inner surface only of the placental lamellae, as in *Alloplectus*, but differ from that genus in the shape of the corolla and in being herbs. It will only be necessary to take into consideration *Centrosolenia* and *Nautilocalyx* on the present occasion: definitions of the remainder* are given by Hanstein in Linnaea, vol. xxvi. pp. 206, 207, and Oersted, Gesneraceae centro-americanæ, p. 38.

Centrosolenia was founded by Bentham in Hook. Lond. Journ. Bot. vol. v. 1846, p. 362, on *C. hirsuta*, Benth., a creeping herb collected in British Guiana by Robert Schomburgk. Neither the placentation nor the anthers were mentioned in the original description. A flower-bud from the type specimen was therefore examined by the writer, who found that the placental lamellae bore ovules on the inner surface only, and that the anthers were didymous, with a didymous connective. *Episcia densa*, C. H. Wright (Kew Bull. 1895, p. 17; Bot. Mag. t. 7481), has similar placentation and anthers, and is therefore transferred to the genus *Centrosolenia* as *C. densa*, Sprague, comb. nov. It may be noted here that several of the genera segregated from *Episcia* have characteristic anthers. Those of *Nautilocalyx* have a much thickened oblong connective, bearing two parallel mussel-shaped thecae, which dehisce introrsely.

The genus *Nautilocalyx* was described in 1853 by Hanstein (Linnaea, vol. xxvi. pp. 206, 207), according to whom the name appeared two years earlier in Linden, Cat. 1851, p. 12. According to Hooker and Hanstein, Linden gave the name *Nautilocalyx hastatus* to the type species, but this was rejected by Sir W. J. Hooker, who described it in 1852 under the name *Centrosolenia bractescens* (Bot. Mag. t. 4675). There is no evidence to show that Linden's Catalogue of the year 1851 contained a botanical description of the genus or species. The first valid description of the species appears to have been published in 1851, as *Centrosolenia bracteata*, Planch. (Fl. des Serres, vol. vi. p. 322, cum ic.), and the first valid description of the genus seems to have been published in 1853 (Linnaea, vol. xxvi. pp. 206, 207). The type species should accordingly bear the name *Nautilocalyx bracteatus*.

An enumeration of the species of *Nautilocalyx* is appended. As many of the best specific characters are with difficulty observable in a dried state, it has not seemed desirable to attempt the construction of a clavis, but diagnostic characters are given under the species as far as possible. *N. bracteatus* is placed at the head of the list on account of its peculiar characters, and the remaining species follow in chronological order.

* *Skiophila pulchella* is to be excluded from *Skiophila*. Hanstein transferred it to *Tussacia* in Linnaea, vol. xxxiv. p. 337.

Nautilocalyx, Linden, Cat. 1851, p. 12, nomen; Hanst. in *Linnaea*, vol. xxvi. 1853, pp. 206, 207; genus hic extensum a *Centrosolenia*, Benth., antheris differt.

Calyx zygomorphus; segmenta ampla, tenuia, saepius libera (in specie unica, *N. bracteato*, segmenta antica et lateralia inferne connata); segmentum posticum calcare corollae basi repulsum, valde curvatum, superne erectum, cetera erecta. *Corolla* subinfundibularis, basi postice calcarata, tubo dorsiventraliter compresso, limbo patulo lobis subaequalibus. *Filamenta* in vaginam postice fissam corollae tubo adnatam connata; antherae per paria apicibus connectivorum connatae, connectivo dorso valde incrassato, loculis omnino sejunctis parallelis mytiliformibus. *Disci glandula* unica, postica (rarius etiam glandula antica). *Ovarium* placentis bilamel-latis, lamellis introrsum tantum ovuliferis.—*Herbae* e basi ramosae, caulibus pluribus erectis subaequalibus (in *N. hirtifloro* caulis radicans). *Cymae* axillares, sessiles, instar fasciculorum.—*Centrosolenia*, subgen. *Ostreoclamys*, Planchon in *Flore des Serres*, vol. vi. 1851, p. 322. *Episcia*, sect. *Nautilocalyx*, Benth. et Hook. f. Gen. Plant. vol. ii. p. 1007. *Episcia*, sect. *Centrosolenia*, Benth. et Hook. f., l.c., partim. *Episcia*, sect. *Skiophila*, Benth. et Hook. f., l.c., partim. *Allopectus*, sect. *Nautilocalyx*, Sprague in *Kew Bull.* 1910, 384.

1. *N. bracteatus*, Linden ex Planchon in *Fl. des Serres*, vol. vi. 1851, p. 322.—*Centrosolenia bracteata*, Planchon, l.c., cum ic. *C. bractescens*, Hook. Bot. Mag. t. 4675 (1852). *Nautilocalyx hastatus*, Linden ex Hook. l.c.; Hanst. in *Linnaea*, vol. xxvi. 1853, p. 207, t. 2, f. 44 (vide p. 181). *Episcia bractescens*, Hanst. l.c. xxxiv. 1865–1866, p. 351.

COLOMBIA. Province of Pamplona, 1800 m., *Funch et Schlim*, 1714 (ex Planchon, l.c.).

N. bracteatus differs from the remaining species in having large bracts and in the anticous and lateral calyx segments being connate below. Calyx white below, purple above. Corolla white.

2. *N. villosus*, *Sprague*, comb. nov.—*Drymonia villosa*, Kunth et Bouché in *Ind. Sem. Hort. Berol.* 1847, p. 12; Hook. Bot. Mag. t. 4866 (1855). *Episcia villosa*, Hanst. in *Linnaea*, vol. xxxiv. 1865–1866, p. 348.

VENEZUELA. Caracas; Malcato, *Gollmer* (ex Hanst. l.c.).

Villous with white hairs. Calyx segments long-acuminate. Corolla white; tube with purple stripes inside; limb large, flat. Filaments not hirsute above.

3. *N. pictus*, *Sprague*, comb. nov.—*Centrosolenia picta*, Hook., Bot. Mag. t. 4611 (1851). *Paradrymonia picta*, Hanst. in *Mart. Fl. Bras.* vol. viii. pt. 1, p. 403 (1864), in syn.; *Linnaea*, vol. xxxiv. 1865–1866, p. 349, in syn. (vide vol. xxvi. p. 180). *Episcia picta*, Hanst. l.c. 403 (1864); l.c. 349.

AMAZONS REGION. *Spruce*.

Calyx segments long-acuminate. Corolla white; anticous part of tube striped with purple inside. Filaments hirsute above. Disk glands 2.—Placed by Hanstein in the genus *Paradrymonia*, along with *Centrosolenia glabra*, Benth. (Bot. Mag. t. 4552) which has very different anthers. The writer retains *C. glabra*, Benth. as the type (and sole species) of *Paradrymonia*.

4. *N. hirtiflorus*, *Sprague*, comb. nov.—*Episcia hirtiflora*, Spruce, ex Hanst. in Mart. Fl. Bras. vol. viii. pt. 1, p. 402 (1864); Hanst. in Linnaea, vol. xxxiv. 1865–1866, p. 346.

BRAZIL. Upper Amazons: Manaos, in moist forest, *Spruce*, 1299, 1307.

Stem slender, rooting at the nodes. Pedicels slender, about 1 in. long. Flowers cream-coloured.

5. *N. bullatus*, *Sprague*, comb. nov.—*Centrosolenia bullata*, Lemaire, Ill. Hort. vol. xvi. 1869, t. 607. *Episcia tessellata*, Hort. ex Lemaire, l.c.

AMAZONIAN PERU. Maynas (ex Lemaire, l.c.).

Leaves bullate, upper surface dark green, lower surface purple. Calyx segments nearly as long as the corolla-tube. Corolla pale yellow, very hairy outside.

6. *N. Lynchii*, *Sprague*, comb. nov.—*Alloplectus Lynchii* (*Lynchei*), Hook. f. in Bot. Mag. t. 7271 (1892).

Habitat unknown. The species is said to have been introduced by Linden.

Leaves dark green and nearly glabrous above, purple and puberulous below, blade gradually narrowed into the short petiole. Calyx segments much shorter than the corolla-tube. Corolla pale yellow, hairy outside.

7. *N. Forgetii*, *Sprague*, comb. nov.—*Alloplectus Forgetii*, *Sprague* in Kew Bull. 1910, p. 383.

PERU. Collected by *Forget* for Messrs. Sander & Sons, St. Albans.

Leaves with very wavy margins, narrowly subtruncate at the base, green above, and glabrous except on the midrib, red on the lower surface on both sides of the midrib and lateral nerves, pale green elsewhere, midrib sparingly villous, nerves and veins appressed-pilose, mesophyll glabrous; petioles 2 in. long or less, villous. Calyx segments much shorter than the corolla-tube. Corolla pale yellow, hairy outside.

8. *N. hirsutus*, *Sprague*, comb. nov.—*Alloplectus hirsutus*, *Sprague* in Kew Bull. 1911, p. 346.

Stems shortly villous. Leaves with flat margins, cuneate into the base, green on both surfaces, slightly bullate, glabrous above except on the midrib, villous on the nerves below, veins pilose. Calyx segments distinctly shorter than the corolla-tube, shortly villous outside. Corolla pale yellow, hairy outside.

9. *N. pallidus*, *Sprague*, comb. nov.—*Alloplectus pallidus*, *Sprague* in Kew Bull. 1911, p. 346.

PERU. Collected by *Forget* for Messrs. Sander & Sons.

Whole plant pale green. Leaves with flat margins, gradually narrowed into the base, nearly glabrous above, minutely and sparingly puberulous below, especially on the nerves. Calyx segments much shorter than the corolla-tube, nearly glabrous. Corolla creamy-white, hairy outside, front part of tube purple-striped inside, back part with a broad band of purple blotches inside.

To sum up, the following results have been attained :—

1. Restriction of *Episcia* to the section *Cyrtodeira*, Benth. & Hook. f., which includes creeping herbs with spatulate-oblong calyx segments, a red (rarely pale lilac) corolla with a large flat limb, and placental lamellae bearing ovules on both surfaces.

2. Restoration of *Centrosolenia* to generic rank on the grounds of its different anthers and placentation, which were previously undescribed.

3. Re-establishment of the genus *Nautilocalyx* with a wider scope than originally proposed, so as to include various species previously referred to the genera *Episcia*, *Centrosolenia* and *Alloplectus*.

EXCLUDED SPECIES.

Nautilocalyx panamensis, Seem. Bot. Voy. Herald, p. 250, has been transferred to the genus *Achimenes* by Hemsley (Biol. Centr.-Amer., Bot., vol. ii. p. 475).

VIII.—DIAGNOSES AFRICANAE: XLVI.

1301. *Euchaetis Bolusii*, Dümmer [Rutaceae-Diosmeae]; ab affini *E. radiata*, Dümmer, foliis sessilibus anguste ovatis, calycis segmentis ovatis acutis, stylis longioribus facile distinguenda.

Planta circiter 20 cm. alta, caule sparse ramoso, ramis ascendentibus dense foliatis puberulis subrubidis. *Folia* sessilia, stricta, subimbricata, coriacea, 5-7 mm. longa, 2 mm. lata, anguste ovata, apice obtusa, primum utrinque puberula, dorso vix carinata costaeque sparsim glanduloso-punctata, intra subconcaeva demum glabra, nitidula, margine ciliolata. *Bractae* ascendentes, quam folia angustiores, et paullo longiores, flavidae, superne subviridescentes. *Calycis* segmenta 1.3 mm. longa, ovata, acuta, dorso valde carinata, intra concava, utrinque puberula, margine ciliolato. *Petala* 2 mm. longa, late ovata, subacuta, basi a medio angustata. *Stylus* 1 mm. longus, stigmatē capitato.

SOUTH AFRICA. Cape Colony: Bredasdorp Div.; on hills near Bredasdorp, 90 m., *Bolus*, 8473.

It is doubtful whether the relative length of the style is of specific importance in this genus as flowers in the same "head" show variability in this respect. The style of *E. longibracteata*, Schltr., is quoted as "perbrevis," but specimens obviously conspecific have styles slightly exceeding 1 mm. in length.

1302. *Euchaetis Burchellii*, Dümmer [Rutaceae-Diosmeae]; affinis *E. ericoidi*, Dümmer, sed ramulis brevioribus dense foliatis, foliis oppositis decussatis minutis subtrigonis, glandulis staminum differt.

Frutex 1.2 m. altus (teste *Burchell*), copiose dichotomo—ramosus, ramulis 2 cm. longis dense foliatis puberulis. *Folia* subtrigona, arcuato-patentia, obtusiuscula, 1.5-2 mm. longa, dorso seriebus binis glandularum impressarum ad costae carinam subplaniusculam instructa, supra sulcata, nitidula, carnosula, denticulato-ciliata. *Flores* solitarii vel bini, saturate rosei, bracteis nullis vel paucis foliosis flores haud excedentibus. *Calycis* laciniae

scariosae, late obovatae, truncatae, breviter apiculatae, 2 mm. longae, dorso medio carinatae, glabrae, intra puberulae, ciliolatae. *Petala* quam calyx duplo longiora, late spatulata, rotundata, mucronata, subtus glabra, supra in medio linea transversa albo-barbata praeterea a medio ad basin producta munita, inferne ciliata. *Stamina* 2.5 mm. longa, antheris glandula anguste-oblonga translucente terminatis. *Stylus* perbrevis. *Carpella* matura 4 mm. alta, glabra, nitidula, reticulata, seminibus subcompressis—ellipsoideis nigris nitidis, hilo fusco.

SOUTH AFRICA. Cape Colony: Coast Region; Mossel Bay Div., sandy hills near the landing place, Mossel Bay, *Burchell*, 6239; 6239B.

1303. *Euchaetis ericoides*, *Dümmer* [Rutaceae-Diosmeae]; affinis *E. abietinae*, Eckl. et Zeyh., sed habitu ramosiore, ramulis junioribus puberulis, floribus minoribus petalisque spatulatis differt.

Fruticulus ad 15 cm. altus, dichotome ramosus, ramulis foliatis albo-puberulis circiter 3 cm. longis. *Folia* sessilia, opposita, haud decussata, subimbricata, ericoidea, subconca, anguste oblonga, obtusata, 3–4 mm. longa, 0.7–1 mm. lata, dorso convexo-carinata, ad carinam glandulis impressis instructa, utrinque glabra, coriacea, marginibus subhyalinis denticulato-ciliata. *Flores* singuli vel bini, subpedicellati, ad apices ramulorum dispositi, bracteis paucis quam calycis laciniiis vix duplo brevioribus. *Calycis* laciniae rigidae, late obovatae vel oblongae, apice rotundatae, obtuse mucronatae, 2 mm. longae, dorso glabrae, medio valde carinatae, intra puberulae, sed demum glabrae, ciliolatae. *Petala* anguste oblonga vel subspatulata, rotundata, submucronata, margine inferne albo-ciliata. *Stamina* calyci aequilonga, antheris glandula minuta subovali flavida translucente terminatis. *Stylus* perbrevis.

SOUTH AFRICA. Without precise locality, *Admiral Sir F. Grey*.

1304. *Euchaetis radiata*, *Dümmer* [Rutaceae-Diosmeae]; affinis *E. longibracteatae*, Schltr., sed foliis petiolatis pubescentibus, floribus minoribus numerosioribusque differt.

Fruticulus circiter 20 cm. altus, caule sparse ramoso, ramis simplicibus ascendentibus superne dense foliatis puberulis ochraceis. *Folia* erecto-patentia, subcomplanata, breviter petiolata, petiolo subtereti 1 mm. longo, lamina 4–12 mm. longa 1–2.5 mm. lata, lineari-lanceolata, subacuminata, dorso minute pubescentia costa saepe basin versus conspicua apicem versus evanida, obscure perforato-glandulosa, infra sparse puberula demum glabra, nitidula margine ciliolata. *Bractaeae* foliis similes sed paulo longiores, flores valde excedentes, radiato-patentes, stramineae. *Flores* pedicellati, pedicellis 1 mm. longis glabris, ad apicem aggregati vel in axillis bractearum summorum dispositi, bracteis minoribus interspersis. *Calycis* segmenta erecta, ovato-rotundata, apice cuspidata, dorso subcarinata, extra medio carinato-ciliolata, intra vix concava, nisi margine ciliolato glabra. *Petala* quam calyx longiora, 3 mm. longa, ovato-lanceolata, subacuminata, basi subangustata, extra glabra, intra subcarinata, medio transverse albo-barbata, margine inferne dense albo-ciliata, apicem versus involuta. *Discus* carnosulus, cupuliformis. *Stamina* glabra, calycis segmentis

aequilonga, filamentis planiusculis, antheris atrobrunneis glandula parva orbiculari flavida translucente terminatis. *Stylus* cum ovario 1 mm. longus, glaber, stigmatе subcapitato.

SOUTH AFRICA, Cape Colony: Bredasdorp Div.; on hills near Elim, 60 m., *Bolus*, 8532.

1305. *Khaya grandis*, Stapf in *Kew Bull. Add. Ser.* ix. p. 152, anglice [Meliaceae]; a *K. senegalensi*, A Juss., foliis foliolisque multo majoribus, tubo staminali globoso-urceolata, stigmatе sessili distincta.

Arbor alta, glabra. *Folia* 4-juga; rhachis petiolo 6-8 cm. longo incluso ad 25 cm. vel paulo ultra longa; foliola oblonga vel subovato-oblonga, saepe obliqua, breviter vel obscure apiculata, basi rotundata vel breviter cuneata, 18-24 cm. longa, 10-12 cm. lata, papyracea viridia, margine magis minusve undulata, nervis lateralibus utrinque 12-16; petioluli 1-1.2 cm. longa. *Paniculae* 7.5-15 cm. longi, 7.5-10 cm. lati, perlaxi; pedicelli brevissimi vel ad 3 mm. longi. *Flores* pentameri. *Calyx* 2 mm. diametro, planus, sepalis rotundatis. *Petala* 4 mm. longa. *Tubus* staminalis globoso-urceolatus, ore vix constrictus, circiter 4 mm. longus. *Antherae* 1-1.6 mm. longae. *Ovarium* disco crenulato adnatum; stigma disciforme, crenulatum, sessile, ovula circiter 15, biseriata. *Fructus* globosus, 6-6.5 cm. diametro, valvis 6-8 mm. crassis; axis 3 cm. alta, latissima, vertice applanata, angulis inter se 2.5 cm. distantibus. *Semina* transverse late elliptica, 2 cm. alta, 3 cm. lata, ala ad latera 4 mm. lata inclusa—*K. grandifolia*, Thompson, Col. Rep. Misc. No. 51, 1908, pp. 4, 6, 87 (nomen.).

TROPICAL AFRICA. Upper Guinea: Southern Nigeria; West Province, Tupelle, Thompson, 7; without precise locality, Unwin, 17.

Mr. H. N. Thompson also records the species (*Col. Rep. Misc. No. 66*, 1910) from a number of localities in Gold Coast Colony, especially in the western part and in the north-west and south of Ashanti, and he figures a leaf, a fruit and a seed (plate 5); but the specimen at Kew (collected on the banks of Lake Bosumptwi), from which the figures were drawn, hardly bears out the identification. It consists of a leaf 1 m. long with 8 pairs of leaflets, and of some mature fruits, which are rather larger than those of typical *K. grandis* from S. Nigeria.

1306. *Khaya PUNCHII*, Stapf in *Col. Rep. Misc. No. 51*, p. 88, 7, 24, (nomen) et in *Kew Bull. Add. Ser.* ix. p. 152, anglice [Meliaceae]; *K. grandis*, Stapf, affini, sed foliolis minoribus, magis abrupte et distincte acuminatis, ovario disco patelliformi crenato insidente in flore femineo et hermaphrodito superne breviter contracto, in masculo in stylum tenuem distinctum attenuato, stigmatе cylindrico-discoideo.

Arbor alta, glabra. *Folia* 3-4-juga; rhachis petiolo 10-12 cm. longo incluso 25-30 cm. longa; foliola ovato-oblonga vel oblonga breviter et plerumque abrupte anguste acuminata, basi rotundata vel breviter lateque cuneata, 10-18 cm. longa, 5-10 cm. lata, papyracea, viridia, margine plus minusve undulata, nervis lateralibus utrinque 9-12; petioluli 6-12 mm. longi. *Paniculae* 15-22 cm. longae, 7.5-10 cm. latae, laxiusculae; pedicelli brevissimi. *Flores* pentameri. *Calyx* ad 1.5-2 mm. diametro, planus, sepalis rotundatis. *Petala*

4-5 mm. longa. *Tubus* staninalis globoso-urceolatus, ore vix contractus, circiter 4 mm. altus. *Antherae* 1-1.3 mm. longae. *Ovarium* disco patelliformi crenato insidens, in flore sterili (masculo) in stylum tenue distinctum attenuatum, in flore fertili (hermaphrodito vele femineo) superne breviter contractum; stigma cylindraceo-discoideum. *Fructus* globosus, 6-7 cm. diametro, valvis 6-9 mm. crassis; axis 3-3.2 cm. alta, latissima, vertice obtusa, angulis inter se 2.5 cm. distantibus. *Semina* transverse late elliptica, 2-2.2 cm. alta, 3-3.2 cm. lata, ala ad latera 4-5 mm. lata inclusa.

TROPICAL AFRICA. Upper Guinea: Southern Nigeria; Ibadan Forest Reserve, *Punch*, 104; Benin, *Unwin*, 18; without precise locality, *Foster*, 89.

Mr. H. N. Thompson (*Col. Rep. Misc.* No. 66, pp. 72, 190) reports *K. Punctii* also from the "fringing" forests (gallery woods) of North Western Ashanti, but there are no specimens at Kew, from this locality.

1307. *Isoberlinia*, *Craib et Stapf* [Leguminosae-Amherstieae]; gen. nov. a *Berlinia*, Sol., paniculis longioribus, floribus minoribus subsessilibus, receptaculo brevi; petalis inter se subaequalibus sepalis subaequalitatis vel ea paullulo superantibus recedit.

Receptaculum breve. *Sepala* 5. *Petala* 5, inter se subaequalia, sepalis paullulo superantia vel iis subaequalia, posterius quam aliis plerumque parum latius, sessilia vel subsessilia, nunquam longe unguiculata. *Stamina* 10, omnia fertilia, exserta; antherae oblongae, uniformes. *Ovarium* stipitatum, stipite receptaculo postice adnato, ovulis circiter 6; stylus elongatus, filiformis, stigmatibus parvo terminali. *Legumen* lignosum, compressum; semina rotundata, compressa.—*Arbores* haud armatae. *Folia* abrupte pinnata; foliola rigide chartacea vel coriacea. *Flores* mediocres, in paniculis terminales et racemis spiciformibus constitutis dispositi. *Bracteae* parvae, deciduae; bracteolae magnae, concavae, alabastra obtegentes, post anthesin plus minusve persistentes.

Isoberlinia Dalzielii, *Craib et Stapf*, ab *I. tomentosa*, *Craib et Stapf* (*Berlinia tomentosa*, Harms), foliolis basi plerumque truncatis vel subcordato-truncatis apice emarginatis differt.

Ramuli fusci, minute cinereo-puberuli. *Folia* abrupte pinnata, ad 30 cm. longa, petiolo ad 10.5 cm. longo ut rhachi fulvo-tomentello suffulta; foliola opposita vel subopposita, utrinque plerumque 4, ovato-lanceolata, late ovata vel oblonga, basi plerumque truncata, inaequalia, apice emarginata vel emarginulata, 6-15 cm. longa, 4-9.5 cm. lata, supra primo pilosula, matura glabra, subtus primo subsericea, matura molliter tomentella, subcoriacea, nervis lateralibus utrinque 8-11 supra conspicuis subtus prominentibus nervis transversis supra conspicuis subtus prominulis; petioluli 1 cm. vix attingentes, indumento ut rhachi. *Panicula* 30 cm. longa, 17 cm. lata, rhachi ramulisque fulvo-tomentellis; bracteae deciduae, deltoideae, vix 5 mm. longae, 4 mm. latae, extra fulvo-tomentellae, intra apicem versus pilosulae; bracteolae 1.1 cm. longae, 9 mm. latae, extra fulvo-tomentosae, intra albo-tomentello-pilosae. *Receptaculum* ad 4 mm. altum. *Sepala* 5, subaequalia, 7 mm. longa, 2 mm. lata, glabra. *Petala* subaequalia, 1 cm. longa, 5 mm. lata, glabra, breviter unguiculata. *Filamenta* 1.4 cm. longa,

basi parce pubescentia. *Ovarium* 7 mm. altum, dense pilosum, 6-ovulatum; stylus 1.6 cm. longus, inferne parce pilosus.

TROPICAL AFRICA. Upper Guinea: Northern Nigeria; Kontagora, *Dalziel*, 26.

To this species probably also belongs *Dudgeon*, 8, from Zaria, Northern Nigeria, represented in the herbarium by two leaves and a sketch of the fruit which gives the pod as 26.5 cm. long and 1.1 cm. broad; on the sketch it is noted that the "pod is covered with brown-velvety pubescence."

1308. *Isoberlinia* Doka, *Craib et Stapf* [Leguminosae-Amherstieae]; ab *I. Dalzielii*, *Craib et Stapf*, foliolis glabris facile distinguenda.

Arbor, inflorescentia excepta, glabra. *Folia* abrupte pinnata, ad 26 cm. longa, petiolo 4.5-7.5 cm. longo suffulta, rhachi petioloque teretibus; foliola utrinque 3, ovato-elliptica, ovata vel ovato-lanceolata, apice rotundata vel plerumque subacuminata, obtusiuscula, interdum parum retusa, basi subtruncata, rotundata vel late cuneata, nonnunquam inaequalia, 8-13 cm. longa, 4.5-7 cm. lata, subcoriacea, nervis lateralibus utrinque 8-10 supra conspicuis subtus prominulis, nervis transversis utrinque subprominulis; petioluli 5-7 mm. longi. *Paniculae* terminales, 12-18 cm. longae, 4-8 cm. latae, e racemis spiciformibus ad 10 cm. longis constitutae, ramulis primo minute pilosis mox glabris; bracteae late ovatae, acutae, ad 4 mm. longae, deciduae; bracteolae 9 mm. longae, 6 mm. latae, extra minute fulvo-pilosulae, intra appresse albo-pubescentes. *Receptaculum* 3.5 mm. longum, 2 mm. diametro, glabrum. *Sepala* 7 mm. longa, 1.75 mm. lata, subaequalia, glabra. *Petala* ad 1 cm. longa et 3.75 mm. lata, subaequalia, glabra, breviter unguiculata. *Filamenta* 1.4 cm. longa, inferne parce pilosa. *Ovarium* brunneo-pilosum, circiter 5 mm. altum, 6-ovulatum.

TROPICAL AFRICA. Upper Guinea: Northern Nigeria; Katagum, *Dalziel*, 364; Sokoto, *Dalziel*, 334.

To this species may be referable *Dudgeon*, 9, from Zaria, Northern Nigeria, represented by two leaves and a sketch of the fruit. From this sketch the pod is about 28.5 cm. long, 7 mm. thick and 7 cm. broad; an accompanying note says "pod glabrous."

1309. *Daniellia* caudata, *Craib* [Leguminosae - Amherstieae]; species ob folia obtuse caudatim acuminata nervosque laterales numerosos patulos distincta.

Arbor, inflorescentia excepta, glabra. *Foliola* opposita, plerumque oblonga, apice caudatim acuminata, obtusa, basi parum inaequalia, late cuneata, 10-11.7 cm. longa, 3.5-4.8 cm. lata, rigide chartacea, nervis lateralibus utrinque numerosis parallelis patulis intra marginem arcuatis inter se 1.5-3 mm. distantibus pagina utraque conspicuis, nervis transversis subconspicuis; petioluli 1 cm. longi. *Pedicelli* 1.2 cm. longi. *Receptaculum* vix 5 mm. altum, 5 mm. diametro, ut in pedicellis dense breviter molliter pubescens. *Sepala* 4, ad 1.7 cm. longa, 0.8-1.1 cm. lata, extra plus minusve pubescentia. *Petala* majora 3, circiter 1 cm. longa, 0.6-1 cm. lata, minora ad 2.5 mm. longa, 1.5 mm. lata, acuminata, acuta. *Filamenta* inferne

pilosa. *Ovarium* praecipue in suturis et in stipite molliter tomentoso-pubescent. *Legumen* 6·5 cm. longum, 3·3 cm. latum, stipite 9 mm. longo vix glabro suffultum.

TROPICAL AFRICA. Upper Guinea: Southern Nigeria; Central Province, Agogidigbo, *Unwin*, 179.

1310. *Daniellia Fosteri*, *Craib* [Leguminosae-Amherstieae]; a *D. Punchii*, *Craib*, cui affinis, cortice haud stramineo, foliolis longioribus acute acuminatis recedit.

Arbor, inflorescentia excepta, glabra; ramuli cortice viridescente laevi subnitido obtecti. *Folia* 27–42 cm. longa, petiolo ad 5 cm. longo suffulta; foliola utrinque 7–9, opposita vel subopposita, oblonga, apice acuminata, acuta, basi inaequalia, latere altero cuneata vel late cuneata, altero rotundata, 17 cm. longitudinis vix attingentia et 5 cm. latitudinis paullo superantia, chartacea, subtus pauci-glandulosa, nervis lateralibus utrinque circiter 10 intra marginem arcuatis supra conspicuis subtus prominulis, nervis transversis supra conspicuis vel subconspicuis subtus prominulis; petioluli 6–8 mm. longi. *Pedicelli* circiter 1·3 cm. longi. *Bracteolae* deciduae. *Receptaculum* circiter 4 mm. altum, 4 mm. diametro, ut in pedicellis molliter tomentoso-pubescent. *Sepala* 4, ad 1·4 cm. longa et 1·2 cm. lata, extra plus minusve pilosula. *Petala* majora 3, 0·8–1 cm. longa, 6–9 mm. lata, extra plus minusve subpilosa, minora circiter 2 mm. longa. *Filamenta* inferne pilosa. *Ovarium* cum stipite dense breviter albo-pubescent.

TROPICAL AFRICA. Upper Guinea: Lagos; Mamu Reserve, *Foster*, 156. Southern Nigeria; Western Province, Jebu Ode, *Millson*, 37.

1311. *Daniellia Punchii*, *Craib* [Leguminosae-Amherstieae]; a *D. Fosteri*, *Craib*, cortice stramineo, foliolis obtuse acuminatis recedit.

Arbor, nisi inflorescentia, glabra; ramuli cortice stramineo nitido vel subnitido obtecti. *Foliola* alterna, lateribus inaequalibus altero oblongo altero oblongo-obovato vel subelliptico, apice acuminata, obtusa, basi inaequalia latere oblongo cuneato vel late cuneato altero late cuneato vel rotundato, 12·5–14 cm. longa, 5·5–6 cm. lata, chartacea, nervis lateralibus utrinque circiter 9 intra marginem arcuatis supra conspicuis subtus prominulis, nervis transversis supra conspicuis subtus prominulis; petioluli circiter 5 mm. longi. *Pedicelli* circiter 1·2 cm. longi, ut in receptaculo inflorescentiaeque ramulis dense breviter molliter fulvo-pubescentes. *Bracteolae* 7 mm. longae, vix 4 mm. latae, deciduae. *Sepala* 4, 1–1·2 cm. longa, 5–9 mm. lata, extra plus minusve pilosula. *Petala* majora 0·9–1 cm. longa, 6–8 mm. lata, plus minusve pilosula, minora oblonga, acuminata, acuta, 3 mm. longa, 1 mm. lata. *Filamenta* basi pilosa. *Ovarium* cum stipite plus minusve pubescens.

TROPICAL AFRICA. Upper Guinea: Southern Nigeria; Lagos, Ibadan Forest Reserve, *Punch*, 115.

1312. *Daniellia similis*, *Craib* [Leguminosae-Amherstieae]; a *D. Ogea*, *Rolfe*, foliolis majoribus formae diversae nervis lateralibus numerosioribus recedit.

Arbor, inflorescentia excepta, glabra; ramuli validiusculi, cortice rubro-brunneo subnitido pauci-lenticellato obtecti. *Folia* 23–27 cm.

longa, petiolo 2-5 cm. longo subterete suffulta; foliola opposita, utrinque 8, oblonga vel oblongo-lanceolata, apice acuminata, basi inaequalia, late cuneata vel rotundata, 6-10 cm. longa, 1.8-3.7 cm. lata, coriacea, nervis lateralibus utrinque circiter 12 intra marginem arcuatis supra conspicuis, margine recurvo; petioluli 5-7 mm. longi. *Pedicelli* ad 1.2 cm. longi, ut in inflorescentiae ramulis receptaculoque molliter tomentoso-pubescentes; bracteolae deciduae. *Receptaculum* 4 mm. altum, 4 mm. diametro. *Sepala* 4, ad 1.6 cm. longa et 1.1 cm. lata, extra plus minusve tomentello-pubescentia. *Petala* majora 1-1.1 cm. longa, 4.5-9 mm. lata, minora acuminata, acuta, 3.5 mm. longa, 1.5 mm. lata. *Filamenta* inferne pilosa. *Ovarium* cum stipite pubescens.

TROPICAL AFRICA. Upper Guinea: Gold Coast; without precise locality, *Comm. Imp. Inst.* 1909; *Dudgeon*, 5 (leaf only).

1313. *Paradaniellia*, *Rolfe* [Leguminosae-Amherstiae]; genus novum affine *Danielliae*, J. J. Benn., corolla monopetala vel petalis lateralibus et anticis rudimentariis distincta.—*Daniellia*, Benth. et Hook. f. *Gen. Plant.* i. 580, ex parte (non J. J. Benn.); Harms in *Engl. and Prantl. Nat. Pflanzenfam.* iii. 3, 141.

Calyeis tubus discifer, anguste turbinatus; segmenta 4, subaequalia, valde imbricata. *Petalum* normale 1, sessile, oblongum; petala lateralia et antica obsoleta vel rudimentaria. *Stamina* 10, libera, filamentis elongatis glabris; antherae oblongo-lineares, loculis longitudinaliter dehiscentibus. *Ovarium* longe stipitatum, stipite basi disco arete cincto, supra medium circiter 14-ovulatum; stylus elongatus stigmatibus terminali capitato. *Legumen* stipitatum, oblique ovato-oblongum, subfalcatum, plano-compressum, coriaceum, 2-valve, endocarpio elastice secedente. *Semen* saepissime 1, ex apice pendulum, ovatum, plano-compressum; funiculus, elongatus filiformis, apice in arillum parvum dilatatus; testa dura; albumen nullum; cotyledones planae; radícula brevis, recta.

Paradaniellia Oliveri, *Rolfe*; species unica.

Arbor excelsa, 15-45-metralis, glabra. *Folia* alterna, abrupte pinnata, 15-35 cm. longa; foliola 5-8-juga, oblique ovata vel ovato-oblonga, subobtusata vel breviter et abrupte acuminata, 6-17 cm. longa, basi saepe rotundata, subtus reticulata, plus minusve pellucido-punctata; petioluli 0.5-1.5 cm. longi. *Panicula* ampla, 10-20 cm. longa, 8-15 cm. lata, multiflora, ramis alternis patentibus recurvisve. *Bracteolae* geminatae, caducissimae, tenuiter coriaceae. *Pedicelli* 1-1.3 cm. longi, apice dilatati. *Calyeis* segmenta oblonga vel elliptico-oblonga, obtusa, concava, 1-1.3 cm. longa, extus reticulato-rugosa. *Petalum* oblongum vel elliptico-oblongum, obtusum, concavum, 8-10 cm. longum. *Stamina* 2-3 cm. longa. *Ovarium* stipitatum, lanceolato-ellipticum, compressum, 1-1.3 cm. longum; stylus gracilis, circiter 2 cm. longus. *Legumen* oblique ovato-oblongum vel elliptico-oblongum, compressum, apice rostratum, 5-8 cm. longum, 3-4 cm. latum. *Semen* late elliptico-oblongum vel suborbiculare, compressum, 2-2.5 cm. longum. *Funiculus* gracilis, circiter 2 cm. longus.—*Daniellia thurifera*, Oliv. *Fl. Trop. Afr.* ii. (1871) 300, ex parte (non J. J. Benn.); Oliv. in *Hook. Ic. Plant.* t. 2406; Harms in *Engl. Jahrb.* xxvi. 209; Volkens in *Notizbl. Königl. Bot. Gart. Berlin.* App. 22, pp. 89, 92,

fig. 45; Guignard in Journ. de Bot. xvi. 69; Pobequin Ess. Fl. Guin. Fr. 55, 234, t. 65; Engl. and Drude, Veg. Erde, ix. 1, 801, fig. 674.

TROPICAL AFRICA. Upper Guinea: Senegambia, *Heudelot*, 364; Casamance, at Koulaye Kouraye, *Chevalier*, 2969; Northern Nigeria: Nupe, *Barter*, 978; Kontagora, *Dudgeon*, 62; Dalziel, 16; Southern Nigeria: Lagos, *Foster*, 151; Ishan County, *Dennet*, 102; without precise locality, *Unwin*, 23. Chari oriental, Dar Banda, *Chevalier*, 6638.

This noble tree has hitherto been confused with *Daniellia thurifera*, J. J. Benn., but a comparison with the original specimen of the latter at the British Museum shows that it is quite distinct. The latter was described by Bennett in 1855 (*Pharm. Journ.* xiv. 251), being primarily based upon a fruiting specimen collected in Sierra Leone by Dr. Daniel, though the author had "no doubt" that a flowering specimen collected by Afzelius belonged "to the same genus, if not to the same species." The petals were described as three or four. There being no specimen at Kew, another plant was included under the same name, from which came the statement in the generic character, "Petalum 1, sessile, oblongum (v. ex Benn. petala 3-4)" (Benth. et Hook. f., *Gen. Plant.* i. 580). This was obtained from the specimens, "Senegambia, *Heudelot*; Niger Expedition, *Barter*," subsequently cited by Oliver under *Daniellia thurifera*, Benn. (Oliv., *Fl. Trop. Afr.* ii. 300). The second specimen was figured in 1895 as *Daniellia thurifera*, Benn. (Oliv. in Hook. *Ic. Plant.* t. 2406). Since this period the name has been completely transferred to the new plant. Dr. Harms in 1907 pointed out that two genera had been included under *Daniellia*, and not unnaturally, under the circumstances, limited the latter to the species figured in the *Icones Plantarum*, describing the other as a new genus under the name of *Cyanothyrsus* (Engl. and Prantl., *Nat. Pflanzenfam. Nachtr.* iii. 3, 197; *Engl. Jahrb.* xxvi. 269). This, however, is the original *Daniellia*, J. J. Benn., to which the three species given by Dr. Harms must be transferred, as follows: *Daniellia oblonga*, Oliv. (*Cyanothyrsus oblongus*, Harms in *Engl. Jahrb.* xxvi. 270; *D. Soyauxii*, Rolfe (*C. Soyauxii*, Harms, l.c.); and *D. Ogea*, Rolfe (*C. Ogea*, Harms, l.c.). This leaves *Daniellia thurifera*, Oliv., without either a generic or specific name, hence that of *Paradaniellia Oliveri*, Rolfe, now proposed. *Paradaniellia* is a tall forest tree, characteristic of dry open savannas, and very widely diffused. Barter describes the flowers as white, and remarks that the natives collect a gum-like copal from the tree. Its economic properties have been dealt with in Kew Bull. Add. Ser. ix. 270, by Mr. J. H. Holland. It is represented at Kew by abundant material.

1314. *Acacia Dalzielii*, Craib [Leguminosae - Mimoseae]; *A. amythetophyllae*, Steud., peraffinis sed foliolis rigidioribus, panicula multo majore eiusque indumento parciore, corolla brevior differt.

Arbor 3-6 m. alta (ex *Dalziel*); rami minutissime puberuli, cortice cinnamomeo obtecti. *Folia* ad 23 cm. longa, petiolo 4-5.5 cm. longo basi glandula sessili plerumque oblonga 0.5-0.8 cm. longa instructo suffulta, rhachi supra, nonnunquam indistincte, canaliculato lateraliter angulato minutissime puberulo; pinnae utrinque ad

23, 13 cm. longitudine attingentes, rhachi supra canaliculato minutissime puberulo; foliola utrinque ad 60, linearia, obliqua, acutiuscula, 6-8.5 mm. longa, 1-1.5 mm. lata, distincte uninervata, pauperrime ciliata; stipulae spinescentes, 1 mm. longae, prorsus directae. *Paniculae* 26-31 cm. longae, 14-15 cm. latae; rami rigidi, subdivaricati; ramorum bracteae parvae, rigidae, deciduae; pedunculi plerumque 3-ni, ad 2.5 cm. longi, puberuli, medio bracteati, bracteis subrigidis in cupulam plerumque 3-lobatam connatis. *Capitula* ad 1 cm. diametro, lutea; bracteae spathulatae, apice rotundatae, 1 mm. altae, 0.75 mm. latae, dorso carinatae, rigidae, ciliatae. *Calyx* turbatus, 1.25 mm. altus, lobis brevibus rotundatis ciliatis. *Corolla* cylindracea, 2.5 mm. alta, lobis apice subacutis incrassatis. *Stamina* 4.5 mm. longa; antherae parvae, connectivo apice glandula stipitata instructo. *Legumen* anguste oblongum, subrectum, apice obtusum, basi angustatum, ad 11.5 cm. longum, 1.7 cm. latum, stipite circiter 1 cm. longo suffultum, valvis rigide chartaceis extra atris tenuiter reticulatis.

TROPICAL AFRICA. Upper Guinea: Northern Nigeria; Sokoto, *Dalziel*, 320.

Vern. Gwanno or Gabacharra.

Shaw, 85, from Yola, in flower only, probably also belongs to this species.

1315. *Acacia Dudgeoni*, *Craib* [Leguminosae-Mimosaceae]; ab affini *A. Senegal*, Willd., pinnis utrinque ad 11, foliola utrinque ad 20 gerentibus differt.

Ramuli stricti, primo parce pubescentes, mox puberuli vel fere omnino glabri, cortice rubro-brunneo striato obtecti; spinae infrastipulares prorsum arcuatae, infrafoliaries recurvae, quam laterales parum longiores et crassiores, 5 mm. longae, omnes brunneae, primo parvis pubescentes, mox fere glabrae. *Folia* ad 4 cm. longa, petiolo 0.7-1.3 cm. longo ut rhachi pubescente glandula parva rotundata sessili paullo supra basin instructo suffulta; pinnae utrinque ad 11, 1.3-2.8 cm. longae; foliola utrinque ad 20, oblongo-linearia, apice rotundata, 3 mm. longa, 1 mm. lata, plerumque pauperrime ciliata, margine parum recurvo. *Spicae* axillares, solitariae, 2.6-4.5 cm. longae, 1 cm. diametro. *Calyx* 1.75 mm. longus, circiter ad medium lobatus, pilis paucis erectis instructus. *Corolla* calycem paullo superans. *Stamina* circiter 4 mm. longa. *Legumen* breviter stipitatum, 3-8.5 cm. longum, 2-2.5 cm. latum, glabrum, valvis reticulatis, seminibus solitariis vel 2-3 brunneis compressis 1 cm. diametro.

TROPICAL AFRICA. Upper Guinea: Northern Nigeria; "said to be common in Borgu," *Dudgeon*, 58; Kontagora, *Dalziel*, 41.

1316. *Corynanthe Lane-Poolei*, *Hutchinson* [Rubiaceae-Cinchoneae]; affinis *C. Johimbe*, K. Schum., foliis minoribus non verticillatis basi vix attenuatis nervis tertiariis aretis parallelis subtus prominentibus, calycis segmentis longioribus differt.

Arbor excelsa, cortice deciduo viridi-brunneo; ramuli laeves, glabri. *Folia* decussata, suboblique oblongo-elliptica, breviter abrupte acuminata, basi cordata vel rotundata, 9-15 cm. longa, 5-8 cm. lata, rigide coriacea, utrinque glabra, supra paullo nitida, subtus pallida, nervis lateralibus 9-13 patulis supra leviter immersis subtus cum venis aretis parallelis prominentibus; petioli 4-7 mm. longi,

glabri; stipulae mox deciduae, lanceolatae, subacutae, ad 1.5 cm. longae, glabrae. *Paniculae* axillares, quam folia paullo lingiores, floribundae; axis et rami puberuli. *Flores* pallide flavi, demum roseo-purpurei, breviter pedicellati, subumbellatim congesti; pedicelli ad 1 mm. longi, puberuli. *Receptaculum* subglobosum, 1 mm. longum, puberulum. *Calycis* segmenta subulata, circiter 1 mm. longa, ciliata, extra puberula. *Corollae* lobi lineares, subteretes, 1 cm. longi, glabri. *Antherae* vix 1 mm. longae. *Ovarium* biloculare; stylus brevis, bifidus, glaber. *Fructus* non visus.

TROPICAL AFRICA. Upper Guinea: Sierra Leone; York Pass, *Lane-Poole*, 46 (1 June, 1911).

1317. *Gardenia* (*Rothmannia*) *sokotensis*, *Hutchinson* [Rubiaceae-Gardeniaceae]; affinis *G. succosae*, Baker, sed ramis puberulis vix resinosis, foliis minus coriaceis venis laxis, floribus longe pedicellatis differt.

Frutex parvus; rami teretes, circiter 3 mm. diametro, dense puberuli vel subtomentelli, nodis plerumque 1-2 cm. distantibus. *Folia* subsessilia, elliptica vel oblongo-elliptica, utrinque rotundata, basi interdum subinaequalia, rarius paullo cuneata, 5-8 cm. longa, 2-5 cm. lata, integra, firme chartacea, utrinque minute puberula, nervis lateralibus utrinque 10-13 supra paullo subtus valde prominentibus, venis laxis subinconspicuis; stipulae ovato-triangulares, subacutae, 6-7 mm. longae, basi 5 mm. latae, plus minusve membranaceae, extus puberulae. *Flores* ad apices ramulorum brevium, solitarii, pedicellati; pedicelli 1-1.5 cm. longi, graciles, viscidè puberuli. *Receptaculum* oblongo-obconicum, 2-2.5 mm. longum, puberulum. *Calycis* tubus campanulatus, 3 mm. longus, tenuis, extra leviter viscidus, fere glaber; lobi lineares, obtusi, dorso carinati, subaequales, 7-8 mm. longi, glabri, virides. *Corolla* alba?; tubus infundibuliformis, 1.2 cm. longus, basi 1.75 mm. apice vix 1 cm. diametro, utrinque minutissime puberulus; lobi 5, suborbiculares, truncati, 0.5 cm. longi et lati. *Antherae* infra medium affixae, lineares, 7 mm. longae, inclusae. *Ovarium* ob placentas centro sese attingentes et cohaerentes spurie 2-loculare; stylus 7 mm. longus, glaber, profunde bilobus, lobis 6 mm. longis complanatis. *Fructus* ellipsoideus, 1 cm. longus, 0.5 cm. diametro, minute puberulus; pericarpium membranaceum. *Semina* ∞ , punctulata.

TROPICAL AFRICA. Upper Guinea: Northern Nigeria; Sokoto, a low shrub on rocky hills, *Dalziel*, 402.

Vernacular—"Gauden duchi."

This plant is remarkable on account of its close affinity with the species quoted above which is found only in Madagascar. In habit and in the structure of its flowers it is very similar, but it differs sufficiently, in the characters given, to be entitled to specific rank.

1318. *Stereospermum leonense*, *Sprague* [Bignoniaceae]; affine *S. acuminatissimo*, K. Schum., a quo foliolis longius petiolulatis brevius acuminatis, calycis lobis rotundatis vel obtusis inconspicue apiculatis, corolla minus infundibuliformi limbo pro rata minore distinguitur.

Arbor mediocris. *Ramuli* haud exstantes. *Folia* exstantia usque ad 43 cm. longa, 6-juga, glaberrima; petioli 6-7 cm. longi, ut rhachis atrobrunnei, supra canaliculati, in basin valde ampliati;

rhacheos internodia 3-5.3 cm. longa; petioluli 3-7 mm. longi marginibus exsiccando inflexis approximatis; foliola elliptico-oblonga vel lanceolato-oblonga (infima interdum elliptica), acutissime acuminata, basi inaequalia latere superiore rotundato inferiore obtuso, 9-13 cm. longa, 4-5 cm. lata, supra opaca nervis brunneis satis obviis venulis majoribus tantum obviis, circa petiolum glandulis nonnullis magnis impressis notata, subtus vix nitidula nervis prominentibus rete venularum densissimo conspicuo glandulis magnis impressis hinc inde inspersis; nervi laterales utrinque 7-10, patuli, intra marginem arcuatim conjuncti. *Cymae* ut videtur multiflorae. *Bractee* lanceolato-lineares, acutissimae, 2-4.5 cm. longae. *Alabastra* inconspicue apiculata. *Calyx* tubulosus, circiter 1.7 cm. longus, basi circumscisse deciduus, glaber; limbus patulus vel ascendens, breviter bilobus sinibus inaequalibus 3-6 mm. longis; lobi late ovati, obtuse apiculati, circiter 6 mm. lati. *Corolla* 4.5-4.7 cm. longa, anguste campanulato-infundibuliformis; tubi pars inferior cylindrica, circiter 1 cm. longa, intus infra basin staminum glanduloso-pilosa, pars superior circiter 2.5 cm. longa intus antice villosa triente inferiore excepta; lobi suborbiculares, 1.1-1.3 cm. lati, paullo minus longi. *Stamina* circiter 1.2 cm. supra basin corollae tubi inserta; filamenta longiora 2 cm. longa, breviora 1.3 cm. longa, omnia basi glanduloso-pilosa ceterum glabra; antherarum lobi 2.5-2.8 mm. longi. *Staminodium* filiforme, 2.5 mm. longum, capitellatum. *Discus* annularis, 1.3 mm. longus. *Ovarium* tetragonum, 6.5 mm. longum, glabrum, sursum angustatum, faciebus late sulcatis, basi vix 1 mm. diametro; stylus circiter 2 cm. longus.

TROPICAL AFRICA. Upper Guinea: Sierra Leone; Wilberforce, Lane-Poole, 56.

1319. *Leucadendron nervosum*, Phillips et Hutchinson [Proteaceae-Proteeae]; species foliis ellipticis vel ovato-ellipticis junioribus dense adpresse villosis utrinque prominenter nervosis valde distinctum.

Frutex circiter 2 m. altus; ramuli longitudinaliter sulcati, longe pilosi. *Folia* elliptica vel ovato-elliptica, apice mucronata, 2.5-5 cm. longa, 1.3-2.5 cm. lata, rigide coriacea, juniora dense adpresse villosa, demum adpresse pubescentia, margine cartilaginea, utrinque prominente nervosa. *Inflorescentia* ♂ solitaria, terminalia, oblongo-ellipsoidea, circiter 2 cm. longa et 1.3 cm. diametro, foliis subtendentibus inferne longe villosis. *Bractee* floriferae oblongae, obtusae, 1.75 mm. longae, paullo concavae, pilosae. *Perianthii* tubus 1 mm. longus, glaber; segmenta spathulato-lineararia, 7 mm. longa; limbus oblanceolatus, 1.75 mm. longus, superne incurvus, extus adpresse-pubescentis. *Antherae* lineares, 1.75 mm. longae. *Squamae hypogynae* lineares, 1 mm. longae. *Stylus* circiter 6 mm. longus, teres, basi pilosus; stigma clavatum, 1 mm. longum. *Flores* ♀ non visi.

SOUTH AFRICA. Cape Colony: Caledon Div.; mountains near Genadendal, Burchell, 7862.

1320. *Bridelia mollis*, Hutchinson [Euphorbiaceae-Phyllanthaeae]; affinis *B. angolensi*, Muell.-Arg., sed foliis supra dense pubescentibus, sepalis ♀ extra rufo-pubescentibus differt.

Arbor parva, circiter 5 m. alta; ramuli juniores brunneo-tomentosi, demum glabri. *Folia* late elliptica vel obovato-rotundata,

apice rotundata vel truncata, interdum leviter emarginata, basi rotundata vel subcordata, 4–12 cm. longa, 3–9 cm. lata, coriacea, supra breviter et dense pubescentia, subtus dense pubescentia, nervis lateralibus utrinque 9–12 ad marginem prolongatis subtus paullo prominentibus, nervis tertiariis arctis subtus leviter prominentibus; petioli 4–5 mm. longi, dense pubescentes; stipulae lanceolatae vel subulato-lanceolatae, 4–6 mm. longae, 2 mm. latae, dense pubescentes. *Flores* ♂ subsessiles vel breviter pedicellati. *Sepala* ovato-triangularia, 3 mm. longa, 2 mm. lata, extra pubescentia. *Petala* late obovata, superne paullo dentata, 2 mm. longa, 1·5 mm. lata, glabra. *Discus* latus, planus, glaber. *Columna* staminalis 1·5 mm. longa, parte filamentorum libera 0·75 mm. longa apicem versus gracili; antherae glabrae. *Ovarii rudimentum* 1 mm. longum, basi dilatatum, glabrum. *Flores* ♀ brevissime pedicellati. *Sepala* ovato-lanceolata, 3 mm. longa, rufo-pubescentia. *Petala* oblongo-lanceolata, sepalis breviora. *Discus* cupularis, lobatus, utrinque glaber. *Ovarium* glabrum. *Fructus* 2-locularis, transverse ellipsoideus vel subglobosus, circiter 8 mm. diametro.—*B. stipularis*, Muell.-Arg. in DC. Prodr. vol. xv. pt. ii. p. 499, partly (as to Kirk's and Burke's Magaliesberg specimens), not of Blume.

TROPICAL AFRICA. Mozambique Dist.: Rhodesia; Victoria, *Monro*, 684; 790; Portuguese East Africa: Boruma, *Menyharth*, 858. *Tete*, *Kirk*.

SOUTH AFRICA. Transvaal: Magaliesberg range, *Burke*. Stretdpoort, *Rehmann*, 5393. Near Rustenburg, *Pegler*, 1063. Warm Baths, Waterberg, *Burt-Davy*, 5603.

This species may be readily distinguished from the Indian and Malayan *B. stipularis*, Blume, with which it was erroneously associated by Müller, among other characters by the absence of the dense ring of long hairs within the base of the female disk.

1321. *Uapaca Gossweileri*, *Hutchinson* [Euphorbiaceae-Phyllanthaeae]; affinis *U. pilosae*, *Hutchinson*, sed foliis subtus furfuraceo-pubescentibus pilis intermixtis nervis tertiariis parallelis differt.

Arbor 5–10 m. vel ultra alta; caulis basi circiter 0·5 m. diametro; rami patuli, ramulis robustis junioribus plus minusve tomentosis. *Folia* sessilia, ad ramulorum apices conferta, obovato-cuneata vel elongato-obovata, apice rotundata vel truncata, basi attenuata, 10–27 cm. longa, 5–15 cm. lata, rigide coriacea, supra viridia subscabrida, subtus furfuraceo-pubescentia, demum fere glabra, nervis lateralibus utrinque 12–17 patulis indivisis subtus prominentibus, nervis tertiariis pluribus parallelis; stipulae filiformes, circiter 1·2 cm. longae, dense pilosae. *Capitula* ♂ ramulorum apices versus conferta; pedunculi 1·2 cm. longi, profunde sulcati. *Involucri* bractae oblongo-ellipticae, obtusae, circiter 1 cm. longae et 0·5 cm. latae, extra leviter pubescentes. *Calyx* irregulariter lobatus; lobi apice parce pilosi. *Filamenta* glabra. *Ovarii rudimentum* late obconicum, superne dense pilosum. *Flores* ♀ juniores non visi. *Fructus* 4-locularis, subglobosus, paullo ultra 2·5 cm. diametro, lenticellis numerosis instructus, glaber. *Pyrenae* dorso bisulcatae.—*U. benguelensis*, Muell.-Arg. in Journ. Bot. 1864, 332, as to specimen with sessile leaves; *Hiern* in Cat. Afr. Pl. Welw. i. 963, partly.

TROPICAL AFRICA. Lower Guinea: Angola; near the River Kutoto, *Gossweiler*, 3206; near Kaconda, *Gossweiler*, 3364;

Gimbundo, *Gossweiler*, 3802; Kului *Gossweiler*, 980; 2937; Huilla; between Lopollo and the River Monino, *Welwitsch*, 453, partly (♂ specimen); near Lopollo, *Welwitsch*, 455 (Herb. Kew non Herb. Mus. Brit.).

The confusion of this species with *U. benguelensis*, Muell.-Arg., was probably caused in the first instance by *Welwitsch* who distributed the two plants with the same number under the impression no doubt that they represented male and female of one species. Mr. *Gossweiler*, however, who has kindly examined them with me and who has seen and collected both in a living state, is confident that there are two distinct species.

1322. *Uapaca pilosa*, *Hutchinson* [Euphorbiaceae-Phyllanthaceae]; species foliis sessilibus subtus longe pilosis pilis erectis nervis tertiariis laxe ramosis valde distincta.

Frutex 1-1.5 m. altus, ramulis junioribus robustis pubescentibus apice tomentosis. *Folia* (juniora) sessilia, ad ramulorum apices conferta, obovato-cuneata, apice rotundata, 13-14 cm. longa, 6-7 cm. lata, integra, tenuiter chartacea, utrinque longe pilosa pilis erectis, nervis lateralibus utrinque 12 patulis prominentibus, nervis tertiariis laxe ramosis supra indistinctis; stipulae subulato-lanceolatae, circiter 5 mm. longae, dense tomentosae, mox deciduae. *Flores* non visi. *Fructus* vix 4 cm. diametro, glaber, exocarpio crustaceo circiter 2 mm. crasso. *Pyrenae* 2.5 cm. longae, 1.2 cm. latae.

TROPICAL AFRICA. Mozambique Dist.: Nyasaland; Stevenson Road, *Scott-Elliott*, 8272.

The material described is imperfect, but the species is easily recognised by the characters given above.

1323. *Crotonogyne parvifolia*, *Prain* [Euphorbiaceae-Crotoneae]; species foliis parvis a ceteris plane recedens, proxima tamen *C. lasiocarpae*, *Prain*, ob ovarium dense setosum.

Frutex 5-6-metralis, rami foliisque glabri. *Folia* alterna, sparsa, breve petiolata, coriacea, anguste lanceolata, obtusa vel subacuta, a triente summo versus basin acutum angustata, margine integra, glabra, 10 cm. longa, 1-1.25 cm. tantum lata, supra saturate-viridia, subtus pallidiora, nequaquam lepidota: nervi laterales utrinsecus ultra 20 sed obscuri; petiolus parce stellato-puberulus, haud lepidotus, 5-6 mm. longus; stipulae ovato-lanceolatae, acutae, 4 mm. longa, stellato-puberulae, haud lepidotae, cito glabrescentes. *Racemi* ad 24 cm. longi, simplices; rhachides glabrae; flores masculi glomerati, glomeruli pauciflori; feminei solitarii versus apicem rhachidis; pedicelli masculi brevissimi, feminei 8 mm. longi, stellato-pubescentes, haud lepidoti; bracteae 2-glandulosae. *Calyx* maris globosus, in alabastro glaucus, demum valvatim 2-lobus, extra stellato-puberulus. *Corolla* alba, gamopetala, calyce longior, tubo late campanulato, intus hirsuto, limbo alte 5-lobo, lobis orbicularibus. *Stamina* circiter 12, exteriora 5, glandulis extrastaminalibus liberis sed contiguis circumcincta. *Calyx* feminei oblongus, stellato-puberulus, haud lepidotus, 4 mm. longus; lobi 5, anguste oblongi, obtusi, eglandulosi. *Petala* 5, alba, imbricata, calyce distincte longiora. *Discus* subinteger. *Ovarium* pilis simplicibus rigidis dense setosum; styli 3, singuli 4-partiti.—*Manniophytum angustifolium*, *Baill.* in *Bull. Soc. Linn. Par. ii.* p. 952 (1891).

TROPICAL AFRICA. Lower Guinea: Gaboon; Ogowe, *Thollon*, 134; 361; 769.

The fact that this species proves to be a *Crotonogyne* renders it necessary to suggest a new specific name, owing to the publication by Dr. Pax of a *C. angustifolia* in Engl. Bot. Jahrb. xix. p. 83 (1894), which differs from the species now described in having much longer leaves and in having a lepidote but not setose ovary. In works in which it is necessary to treat the species now described as *C. angustifolia*, Prain, it may be convenient to substitute the name *C. Soyauvii*, Prain, for the species which in the Flora of Tropical Africa will stand as *C. angustifolia*, Pax.

1324. *Caperonia Buchanani*, *Baker* [Euphorbiaceae-Crotonae]; species *C. palustri*, St. Hil., quam maxime affinis sed foliis margine crenatis apte distinguenda.

Herba annua; caules erecti, simplices, herbacei, superne hispidi, 30 cm. alti. *Folia* breve petiolata, superiora oblonga vel oblanceolata-oblonga, acuta; inferiora obovata, obtusa, margine crenata, basi cuneata, superiora 3.75–5 cm. longa, inferiora 2.5–3.75 cm. longa, omnia 2–2.5 cm. lata, supra viridia, subtus pallidiora, ibique secus nervos parce hispidula; nervi laterales utrinsecus 5–7; petiolus 4–6 mm. longus, hispidus; stipulae lanceolatae, 5 mm. longae, caducae. *Racemi* axillares androgyni, 2–2.5 cm. longi, rhachis pedicellisque hispida vel pubescens; bracteae lanceolatae, parvulae. ♂ *Sepala* 5, elliptico-oblonga, apiculata, glabra. *Petala* 5, valde inaequalia, 3 superiora majuscula, obovata, sepalis longiora, 2 inferiora parvula, oblonga. *Stamina* circiter 10; filamenta breviora. ♀ *Sepala* 5–6, inaequalia, obovata, margine parce denticulata, apice apiculata, 2–3 exteriora quam 3 interiora triente breviora. *Petala* 5, oblanceolata, obtusa, sepalis majoribus breviora. *Ovarium* dense muriculis acutis complanatis obsita. *Capsula* muriculata, 6 mm. lata; sepala accrescentia, 4 mm. longa. *Semina* pallide cinerea, globosa.

TROPICAL AFRICA. Mozamb. Dist.; Nyasaland; without precise locality, *Buchanan*!

Nearest to *C. palustris*, St. Hil., a South American species which is also widespread in Africa.

1325. *Mareya acuminata*, *Prain* [Euphorbiaceae - Crotonae]; species *M. micranthae*, Muell.-Arg., quam maxime affinis; differt foliis tenuioribus distincte abruptius acute acuminatis.

Frutex vel *arbor* parva; ramuli glabri. *Folia* petiolata, membranacea, obovato-lanceolata, abruptius acute acuminata, acumine 1–1.5 cm. longo, margine integerrima, a triente summo versus basin cuneatum attenuata, 12–17 cm. longa, 4–5 cm. lata, saturate viridia, utrinque glaberrima; petiolus glaber, 1.25 cm. longus; stipulae deciduae. *Spicae* sat numerosae, plus minusve flexuosae, 15–18 cm. longae; rhachis angulata, glabra; bracteae ovatae, minutae. *Flores* masculi haud visi; feminei secus rhachin dispositi, solitarii; styli a basi liberi. *Capsula* subglobosa, 3-sulcata, 3-cocca; cocci subglobosi, pubescentes, brunnei, 4 mm. lati.

TROPICAL AFRICA. Lower Guinea: French Congo; Libreville, *Klaine*, 2483.

A very distinct species; the specimens seen have female flowers only, arranged at intervals throughout the whole length of the spike;

possibly therefore the species is a dioecious one. In the other species the spikes have female flowers only towards the bases of the spikes, with males in clusters higher up.

1326. *Macaranga gabunica*, *Prain* [Euphorbiaceae-Crotoneae]; species *M. Klaineanae*, *Pierre*, proxime accedens, sed foliis majoribus ambitu triangulari-ovatis nec elliptico-oblongis, petiolis elongatis, stipulis caducis, capsulisque multo majoribus stylis minus lateralibus facillime distinguenda.

Frutex, ut videtur scandens, ramis elongatis pendentibus, ramulis primum parce rufo-puberulis cito glabrescentibus. *Folia* longe petiolata, triangulari-ovata, longiuscule candato-acuminata, margine integra basi latissime truncata, 8-12 cm. longa (acumine 1-1.5 cm. longo incluso) 7-10 cm. lata, coriacea, supra pallide viridia, opaca, glabra vel parce secus nervum centalem rufo-perberula, subtus pallidiora, secus nervos rufo-pubescentia, glanduloso-punctata, nervi basales 3, 2 minoribus saepissime additis, laterales versus marginem 3-4, medianus utrinsecus 3-4 primarios emittentes, primarii omnes nervis secundariis crebris parallelis obliquis connexi; petiolus 6-8 cm. longus, glaber; stipulae caducissimae haud visae. *Flores masculi* in paniculas angustatas axillares 3-4 cm. longas aggregati; panicularum ramuli perbreves rhachideque dense rufo-pubescentes; bractae rufo-pubescentes, ovatae, obtusae, integrae, flores plures subtendentes. *Calyx* 2-lobus, rufo-pubescent. *Stamina* 2-3. *Flores feminei* in paniculas axillares 2-6 cm. longas aggregati, panicularum ramuli perbreves; tomentum bractaeaeque maris; bractae flores singulos vel paucos subumbellatos distincte pedicellatos subtendentes; pedicelli 2-3 mm. longi. *Calyx* late cupularis, margine undulatus, rufo-pubescent. *Ovarium* 1-loculare, parum incurvum; stylus parum eccentricus. *Capsula* 1-cocca, 1-sperma, 2-valvis, subglobosa, dense rufo-puberula, basi styli minopere lateralis persistente coronata, 1 cm. lata.

TROPICAL AFRICA. Lower Guinea: Gaboon; Libreville, *Klaine*, 642; 643; 1152; 1153. French Congo: Niouneron, *Lecomte*, C9.

1327. *Macaranga Klaineana*, *Pierre* Mss. ex *Prain* [Euphorbiaceae-Crotoneae]; species ut videtur *M. Pynaerti*, De Wild., affinis, differt tamen stipulis persistentibus, tomento rufo-puberulo, bracteis flores subtendentibus quam eae sub panicularum ramulis majoribus.

Frutex scandens, 5-6=metralis. *Ramuli* graciles, rufo-puberuli, sparsim spinulosi; spinuli brevissimi, conici. *Folia* distincte petiolata, ovata vel elliptica, longiuscule caudato-acuminata, margine integra, basi rotundata, 4-7.5 cm. longa (acumine 0.7-1.5 cm. longo incluso), 2-3 cm. lata, chartacea, supra saturate viridia, exsiccando brunea, glabra, subnitida, subtus pallida, secus nervos parce rufo-pubescentia, ceterum glabra, glanduloso-punctata; nervi primarii utrinsecus 4-5, adscendentes, sub margine anastomosantes, nervis secundariis crebris parallelis transversis connexi; petiolus 1-2.5 cm. longus, parce rufo-pubescent; stipulae lineares, rufo-puberuli, 5-6 mm. longi, subpersistentes. *Flores masculi* in paniculas axillares 4-6 cm. longas aggregati, panicularum ramuli 1.5-2 cm. longi rhachideque rufo-puberuli; bractae rufo-puberulae,

basales lanceolatae, florales ovatae, acutae vel obtusae, integrae, flores plures subtendentes, basalibus majores. *Calyx* 2-lobus, rufo-puberulus. *Stamina* 2-3, filamentis antheras subaequantibus. *Flores feminei* in paniculas axillares 2-6 cm. longas aggregati, panicularum ramuli 0.4-0.5 cm. longi; bracteae maris sed florales flores singulos breve pedicellatos vel paucos subumbellatos subtendentes. *Calyx* cupularis, rufo-puberulus, lobis 2-3, inaequalibus, rotundatis. *Ovarium* 1-loculare, incurvum; stylus lateralis, basi echinatus, incurvo-adscendens. *Capsula* 1-cocca, 1-sperma, 2-valvis, subglobosa, glabra, stylo laterali subpersistente notata, 0.5 cm. lata.

TROPICAL AFRICA. Lower Guinea: Gaboon; Libreville, Klaine, 239; 347; 1118; 6436.

1328. *Macaranga* Pierreana, Prain [Euphorbiaceae-Crotonae]; species *M. Poggei*, Pax, affinis sed ramulis glabris, paniculis petiolisque longioribus et bracteis integris facillime distinguenda.

Frutex ramis longis pendentibus, spinis parvis armatis; ramulis glabris. *Folia* longe petiolata, ovata, breviter acuminata, margine integra, basi rotundata, ibique 3-nervia supra 2-glandulosa, membranacea, viridia, supra glabra, subtus crebre glanduloso-punctata, secus nervos pilis albis longiusculis patentibus parce obsita ceterum glabra, 8-15 cm. longa, 6-10 cm. lata; petiolus glaber 7-14 cm. longus; stipulae caducae. *Flores masculi* in paniculas ampliores axillares dispositi; rhachis glabra 15 cm. longa, rami glabri, 2.5 cm. longi, ramuli glabri 4-5 mm. longi capitulas strobiliformes 4 mm. longas gerentes; bracteae puberulae flores 8-10 subtendentes, obovatae, subacutae, margine integrae. *Calyx* 2-lobus, extra puberulus, breviter pedicellatus. *Stamina* 2, filamentis brevissimis vel obsoletis, antheris 4-gonis, locellis 4 approximatis, pollina flavida. *Flores feminei* in paniculas amplas axillares dispositi; rhachis glabra, 10 cm. longa, rami glabri, 1.5-2 cm. longi, pedicelli fructigeri gracillimi, 5-6 mm. longi, puberuli. *Capsula* parvula, 2 mm. lata, 1-cocca, 2-valvis, extra glaberrima.

TROPICAL AFRICA. Lower Guinea: Gaboon; Monte de Cristal, Klaine; near Libreville, Klaine, 1151.

1329. *Klaineanthus*, Pierre Mss. ex Prain [Euphorbiaceae-Crotonae]; genus *Cunuriae*, Baill., proxime accedens sed disco in flore masculino e glandulis extrastaminalibus bene evolutis composito et foliis basi eglandulosis facillime distinguendum.

Flores dioci, apetalii. ♂ *Calyx* basi campanulatus, 5- vel 4-lobus, lobis valde imbricatis. *Discus* e glandulis extrastaminalibus filamentis interioribus alternis, sepalis isomeris iisque oppositis compositus. *Stamina* 10 vel 8, 2-seriata, in receptaculo convexo inserta; exteriora segmentis calycis alterna; interiora exterioribus parum longiora; antherae breves, 2-locellatae, locellis parallelis erectis basifixis, longitudinaliter introrsum dehiscentibus. *Ovarii rudimentum* centrale, oblongum, filamentis interioribus aequilongum, 2-3-fidum. ♀ *Calyx* fere ad basin 5-lobus, rarissime 4-lobus, lobis valde imbricatis. *Discus* cupularis, 5- vel 4-lobus, margine denticulatus. *Staminodia* hypogyna intra discum receptaculo inserta sepalis isomera vel iis pauciora vel omnino obsoleta.

Ovarium 3-loculare, glabrum, 3-sulcatum, ovoideum; ovula in quoque loculo solitaria, sub apice inserta funiculo carnosio in arillum expanso; styli 3 alte 2-partiti, ramis singulis apice iterum breviter obtuse 2-lobis. *Capsula* in coccis 3 2-valves dissiliens; epicarpium tenuiter carnosulum; endocarpium lignosum. *Semina* ovoidea, parum complanata, arillo carnosio aurantiaco involuta; testa crustacea; albumen copiosum fere 2-partitum; cotyledones late ovato-cordatae, planae.—*Arbor* mediocris. *Folia* alterna, eglandulosa, distincte petiolata; petioli superne et inferne pulvino incrassati. *Flores* parvuli, laxe paniculati; paniculae amplae, axillares et terminales, ramis dissitis, ramulis brevibus; masculi sub quaque bractea conferti, feminei subsolitarii; pedicelli utriusque sexus articulati. *Fructus* sub dehiscentiam crepitans.

Klaineanthus gaboniae, *Pierre Mss. ex Prain*; species unica.

Arbor 10–15 m. alta, ramulis in vivo ut videtur rubellis, junioribus pubescentibus, adultis griseis, fere glabris. *Folia* petiolata, oblonga vel obovata, obtuse acuminata, margine integra, basi obtuse vel subacute cuneata, 10–20 cm. longa, 4–9 cm. lata, subcoriacea, supra saturate viridia, subtus pallidiora parum nitidula, utrinque glabra; nervi laterales utrinsecus 8–12 prope marginem anastomosantes, subtus sat prominuli; petioli 3–5 cm. longi, subtereti, apice basique pulvinati; stipulae haud visae. *Flores* paniculati; paniculae axillares et terminales, maris 10–20 cm. feminei 8–12 cm. longae, ramis laxis maris inferne 10–20 cm. feminei 8–10 cm. longis, sursum gradatim brevioribus, ramulis brevibus; rhachis ramulisque pubescentibus vel puberula; bractae pubescentes parvulae, maris flores 2–6, feminei flores subsolitarios subtendentes; pedicelli utriusque sexus pubescentes, calyce breviores, distincte articulati. ♂ *Calyx* campanulatus, 2 mm. longus, lobis 4–5 tubo aequilongis extra pubescentibus margine ciliatis, valde imbricatis, obtusis. *Stamina* 8 vel 10, 2-seriata, interiora longiora; filamenta basi incrassata, superne subulata, glabra, 1.5–1.75 mm. longa, glandulis 4 vel 5 extrastaminalibus liberis circumcincta; glandulae ovatae, apice subdentatae, glabrae, flavae, staminibus exterioribus alternae, interioribus sepalisque oppositae. *Ovarii rudimentum* centrale obscure 3-gonum saepissime 3-partitum, nonnunquam 2-partitum, staminibus interioribus aequilongum. ♀ *Calyx* fere ad basin 5-sectus, raro 4-sectus, lobis obtusis imbricatis extra pubescentibus, margine ciliatis. *Discus* cupuliformis, glaber, denticulatus, 4–5-lobus. *Staminodia* hypogyna subulata ad normam sepalis isomera disco aequilonga vel longiora, nonnunquam obsoleta. *Ovarium* sessile, 3-gonum, 3-loculare, glabrum; ovula prope basin arillo membranaceo margine fimbriato e funiculo expanso dorsaliter lateraliterque oblecta; styli glabri 3, divaricati, patuli, ad tridentem imum 2-partiti, ramis singulis iterum ad apices breviter obtuse 2-lobis. *Capsula* rubra, glabra, 3-sulcata, 2 cm. longa, 2 cm. lata, in coccis 2-valves cum strepitu dissiliens, epicarpio nitido tenue carnosulo, endocarpio lignoso; columella persistens, 3-gona, 1.5 cm. longa. *Semina* ovata, complanata, arillo carnosio luteo oblecta, 1 cm. longa, 8 mm. lata, 5 mm. crassa; testa crustacea, brunnea, nitida; albumen carnosum, fere 2-partitum; cotyledones foliaceae, late ovato-cordatae, basi 3-nerves, 8 mm. longae, 6 mm. latae; radícula minima.

TROPICAL AFRICA. Upper Guinea : Cameroons ; Bipinde, Zenker, 1764 ; 1853 ; 3790 ; 4204.

Lower Guinea : Gaboon ; Libreville, Klaine, 277 ; 1352 ; 1941 ; 2015 ; 2461 ; 2474 ; 2510 ; 3200. Sibange, Klaine, 2576.

1330. *Hamilcoa*, Prain [Euphorbiaceae-Crotoneae] ; genus inter *Gelonias* ob calycem maris imbricatum ponendum sed ob stylos indivisos facillime distinguendum.

Flores dioici, apetalii. ♂ *Calyx* globosus ; sepala 5, libera, valde imbricata. *Stamina* 18, pluriseriata ; antherae subsessiles, 2-locellatae, locellis parallelis, longitudinaliter dehiscentes. *Ovarii rudimentum* 0. ♀ *Calyx* globosus, alte 6-partitus, lobis imbricatis. *Discus* urceolaris. *Ovarium* 2-loculare, glabrum ; stylus crassus ; stigmata 3, libera, crassa, indivisa. *Capsula* 3-cocca ; cocci subglobosi a basi loculicide fissi, pericarpio coriaceo. *Semina* majuscula, globosa ; testa spongiosa ; cotyledones latae, planae. *Frutex* scandens. *Folia* alterna, valde inaequaliter petiolata ; petioli et superne et inferne pulvino incrassati. *Flores* racemosi ; racemi axillares ; pedicelli utriusque sexus sursum distincte incrassati, fere carnosii.

H. Zenkeri, Prain ; species unica.

Frutex scandens, 6-9-metralis. *Folia* nunc longe petiolata nunc in eodem ramo fere sessilia, ovato-oblonga, caudato-acuminata, basi late cuneata, margine remote serrata, tenue coriacea, 10-25 cm. longa, 4-10 cm. lata, supra saturate viridia subnitida, subtus pallidiora, utrinque glabra ; nervi laterales utrinsecus 8-10 prope marginem anastomosantes, subtus distincte elevati ; petiolus basi minopere, apice distincte pulvinatus ibique geniculatus, nunc 4-5 cm. longus, nunc ad pulvinum apicalem reductus 2-4 mm. tantum longus ; stipulae haud visae. *Flores* in racemos axillares distincte pedunculatos 6-8-flores dispositi ; racemi masculi 2-2.5 cm., feminei 4 cm. longi, pedunculis 8 mm. longis, pedicellis versus apicem distincte incrassatis subcarnosis, masculorum 6 mm. femineorum 12 mm. longis. ♂ *Sepala* 5, libera, valde imbricata, ovato-oblonga, obtusa. *Stamina* 18, fere sessilia ; antherae 2-locellatae, longitudinaliter dehiscentes. *Ovarii rudimentum* 0. ♀ *Calyx* 6-partitus, segmentis ovatis obtusis imbricatis. *Discus* urceolatus. *Ovarium* 3-loculare, glabrum ; stylus crassus ; stigmata 3 libera, crassa. *Capsula* 3-cocca, 2 cm. lata ; cocci subglobosi, loculicide dehiscentes. *Semina* globosa, 12 mm. lata ; testa laevis, maculata, spongiosa ; cotyledones latae, planae.—*Plukenetia Zenkeri*, Pax in Engl. Bot. Jahrb. xliii. 83.

TROPICAL AFRICA. Upper Guinea : Cameroons ; Bipinde, Mimfia, Zenker, 2865 ; 30285 ; 3646 ; 4130.

The imbricate male calyx-segments, the subsessile anthers, and to a less extent the leaves, of *Hamilcoa* recall the monotypic West African genus *Plagiostyles*, Pierre. But *P. africana* (*Daphniphyllum africanum*, Muell.-Arg. in Flora xlvii. 536 [1864] ; *Plagiostyles Klaineana*, Pierre in Bull. Soc. Linn. Par. ii. 1327 [1897]), the basis of *Plagiostyles*, differs very greatly in having an oblique, 1-seeded, indehiscent fruit with a lateral style.

IX.—SOME ADDITIONS TO THE KOREAN FLORA.

S. T. DUNN.

Our knowledge of the Korean flora has recently received an interesting addition from Dr. Ralph Mills, who has sent to Kew a collection of some 300 dried specimens of plants collected by him in the neighbourhood of Kangkai. Among them are represented two new species, a new variety, and several new records for the country. Kangkai, or Kangkyei as it is usually written on our maps, is situated near the northern boundary of the country in mountainous surroundings on the bank of the Tong Nai River, the principal affluent of the Yalu upon the Korean side. Its distance from both the east and west coasts is about 80 miles and from the Manchurian frontier 27 miles, and the fact that this part of Korea has scarcely been visited by botanists before adds greatly to the interest of the collection. Dr. Mills describes the mountains among which he gathered his specimens as clothed with vegetation from base to summit, and as bearing a markedly different flora on their northern slopes which drain into the Yalu system from that on the southern. The dividing ridges form indeed at this point a natural line of demarcation between the Manchurian and Korean climates and floras, the moist warm summer season being considerably shorter on the north side, while snow and ice are more frequently seen there and are more persistent. The actual divide follows the crest of the Paik-yek San, which passes from east to west about 30 miles south of the city, and as the much loftier range of the Paik-tou San, the northern watershed of the Yalu basin, lies immediately to the north of it and between it and the greater part of Manchuria, it is a remarkable suggestion and one that will doubtless receive attention that it and not the northern divide forms the phytogeographical boundary between the two floras.

The following species and varieties are new to Korea :—

Euonymus alata, *Thunb.*

Prunus Maacki, *Rupr.*

Neillia Millsii, *Dunn*, sp. nov., *N. sinensi*, Oliv. affinis, calycis tubo brevior, ovulis duobus distincta.

Frutex cortice pallido scabro, ramis floriferis perulatis laxe hirsutis. *Folia* alterna, ovata, acuta, basi truncata, 4–5 cm. longa, grosse biserrata, nonnunquam fere triloba, papyracea, glabra, nervis 4–5-paribus; petioli 4–5 mm. longi, pubescentes; stipulae ovatae, 4–6 mm. longae, foliaceae. *Racemi* vel, ob ramos paucos breves, paniculi terminales, sessiles, 6–10 cm. longi. *Flores* approximati, 6–8 mm. longi, 3–4 mm. lati; pedicelli 4 mm. longi, ut raches, bracteaeque laxae pubescentes; bracteae lineares, pedicello paullo longiores. *Calyx* campanulatus, extus glandulis pedicellatis vestitus, intus minute puberulus, dentibus 5 tubo bis brevioribus lanceolatis. *Petala* 5, ovata, alba, 3 mm. longa, fauce inserta. *Stamina* ibidem, numerosa, petalis his breviora, filamentis basi paullo dilatatis. *Ovarium* uniloculare, liberum, globosum, in stylo aequilongo angustatum, stigmatibus disciforme faucem paullo excedente. *Ovula* 2, a placenta parietali pendula.

Kangkai, Oct. 6th, 1909, *R. Mills*, 107.

A handsome bush when in flower, growing abundantly on the hillsides from Kangkai down the Tong Nai to its junction with the Yalu and thence down to within a few miles of Antung in Manchuria. The fruit is described as green with soft prickles, appearing about midsummer.

Scolopia japonica, Max., var. *parviflora*, Dunn, var. nov. Flores 1.5-1.7 cm. longi.

Kangkai, *R. Mills*, 216. A weed of waste ground.

Chenopodium glaucum, Linn.

Chloranthus japonicus, Sieb. et Zucc.

Humulus japonicus, Sieb.

Allium lineare, Linn.

Erythronium Dens-canis, Linn. Quite abundant in rich woods on the higher hills and also in the open ground. The flowers sometimes as much as 5 inches across. The species has not, hitherto, been recorded from the region embraced in Hemsley's *Enumeration Pl. China*. *R. Mills*, 217.

Lilium concolor, Salisb.

L. elegans, Thunb.

Polygonatum verticillatum, All.

Tovaria japonica, Baker.

Lloydia triflora, Baker.

Arisaema japonicum, Blume.

Acorus Calamus, Linn.

Carex Millsii, Dunn, sp. nov. *C. cryptostachyo*, Brongn. affinis, foliis brevioribus, latioribus distincta.

Folia basalia anguste oblanceolata, acuta, ad basin gradatim angustata, ad 30 cm. longa, 2-3 cm. lata, papyracea, glabra, supra scaberula, basi vestigiis fibrosis cincta, nervis multis, 3 conspicuis. *Scapi* 3-4, circiter foliis aequilongi, basi vaginis paucis brevibus vestiti. *Spicae* 5-6, distantes, saepissime singulae, androgynae, 1.5-2 cm. longae, dimidio superiore masculino, inferiore foemineo, parte foeminea ovale viridula; pedunculi spicis 2-plo longiores; bractae pedunculis paullo breviores, ovatae, convolutae, pedunculum scapumque amplectentes, margine scariosae. *Flores* foeminei 6-9; glumae ovatae, 5 mm. longae, acutae, margine scariosae; utriculus aequilongus, ovalis, brevissime rostratus, glaber, paucinervis; stylus trifidus.

Kangkai, *R. Mills*, 104, May 20th, 1910. In mossy ground among bushes on an isolated hill opposite the town.

X.—MISCELLANEOUS NOTES.

MR. CHARLES CUMMING CALDER, B.Sc. of the University of Aberdeen, has been appointed by the Secretary of State for India in Council, on the recommendation of Kew, Curator of the Herbarium of the Royal Botanic Gardens, Calcutta, in succession to Mr. W. W. Smith (*K.B.*, 1907, p. 403), who has been transferred to the post of Assistant to the Regius Keeper of the Royal Botanic Garden, Edinburgh.

Longevity of Seeds.—An interesting instance of prolonged vitality in the case of the seeds of a Leguminous species is recorded in a letter addressed to Kew by Sir William Herschel, Bart. Sir William writes, under date 22 Jan., 1912 :—"ALBIZZIA LOPHANTHA. An interesting case of germination and flowering of *A. lophantha* after the seeds had been lying dormant 68 years induces me to write to you. The seeds were part of a packet received by Sir John Herschel from the Cape of Good Hope in 1843 and preserved, since his death in 1871, in his cabinet. Seven plants have been successfully reared in 1910 and 1911, of which one, two years old is now some ten or eleven feet high and has flowered abundantly (not seeded) this autumn. From several letters that have passed between Professor Vines and myself, I have gathered much interesting information about the provenance of these seeds and from Sir John's correspondence it is clear that so far back as 1834-5 he was studying them in Africa. I find also now a letter from (Sir) Joseph Hooker acknowledging (to a Mrs. L. Wilson) the receipt at Kew, 16 or 26 March, 1844, of what he describes as 'interesting seeds . . . gathered in Australia' passed on to him as from Lady Herschel. I have little doubt they formed part of the 1843 packet."

In the same letter Sir William was so good as to offer to send to Kew the flowering example of *A. lophantha* referred to above; at the same time he asked whether the letter from Sir Joseph Hooker could be verified.

In the collection of correspondence at Kew no reference has been found to this matter, but in one of the Record Books there is the following entry in March, 1844 :—"Received from Lady Herschel 48 papers of seeds from S. . . ."

The curious fact that the entry has been left incomplete in itself seems sufficient evidence that it refers to the same consignment as that to which the packet of seeds in Sir John Herschel's cabinet, some of which have germinated after an interval of 68 years, belongs. The letter from Mrs. L. Wilson transmitting the seeds on behalf of Lady Herschel has not indeed been preserved, but that this letter said "S. Australia" is almost certain because in a subsequent communication, under date 27 Jan., 1912, Sir William Herschel says that the acknowledgment sent by Sir Joseph Hooker has the words "S. Australia" and these words "are in Hooker's own hand." That the seeds did actually come from Australia in the first instance is almost certainly correct. But it was apparently known at Kew that these seeds had been sent to Sir John Herschel from South Africa, as explained in Sir William Herschel's letter; the writer of the entry in our Record Book, undecided as to whether the word "Africa" or "Australia" should under the circumstances more properly follow the "S.," left his entry incomplete for the moment and never subsequently had his difficulty satisfactorily cleared up. The main interest of the correspondence lies, however, as Sir William Herschel points out, in its affording what appears to be an authentic record of "a flowering two-year old plant after 68 years dormancy" of its seed.

Sir William's promise has been fulfilled and this interesting plant has now been added to the collection at Kew.

Botanical Magazine for February.—The plants figured are *Stanhopea peruviana*, Rolfe (t. 8417); *Stranvaesia undulata*, Decne. (t. 8418); *Leptospermum scoparium*, Forst., var. *Nichollii*, Turrill (t. 8419); *Olearia chathamica*, T. Kirk (t. 8420) and *Crassula Barklyi*, N. E. Br. (t. 8421).

Stanhopea peruviana is a handsome Orchid discovered in Peru by Mr. Forget when collecting on behalf of Messrs. Sander & Sons, St. Albans, most nearly allied to the Mexican species *S. Wardii*, Lodd., but with smaller flowers and narrower petals and with, at the same time, a rather different lip. The flowers are fragrant; as in other species of the genus they last only a few days. The subject of the plate was presented by Messrs. Sander & Sons to the Kew collection in 1909 and flowered there for the first time in January 1910.

Stranvaesia undulata is one of the numerous Chinese plants for whose introduction horticulture is indebted to Mr. E. H. Wilson when collecting on behalf of Messrs. J. Veitch & Sons, and the plant from which the material for the figure published was obtained is one that was purchased by Kew from that firm. In Western China there appear to be several fairly well marked forms of *Stranvaesia*, which however differ from each other by characters that when taken individually seem to be of slight importance. The best known of these forms are those described by Decaisne as *S. undulata* and *S. Davidiana*. Even with large suites of specimens it is not difficult to keep these two apart though it seems necessary to treat the plant termed *S. Henryi* by Dr. Diels as only a form of *S. Davidiana*. More recently, however, Dr. Schneider has decided that it is not possible to separate the latter from *S. undulata* and the plant figured certainly goes far towards justifying this conclusion, because as regards foliage it is the original *S. undulata* whereas it has the inflorescences characteristic of *S. Davidiana*. The evanescent character of the petals detracts from its value as a flowering shrub, but as one with ornamental fruit it possesses great merit and owing to its extremely hardy nature it bids fair to take the place of the *Pyracanth* in places with a cold winter climate. It is easily propagated both by cuttings and from seed.

The *Leptospermum* included in this number only differs from typical *L. scoparium*, a very widely spread and remarkably variable species which is a native both of Australia and of New Zealand, in having petals of a carmine red colour, and in having leaves of the colour of those of the Copper Beech. For its introduction horticulture is indebted to Captain A. A. Dorrien-Smith, who brought it from New Zealand in 1908. To nurserymen in that Colony it is known as *L. Nichollii* and by them is stated to have been first found growing on sand hills north from Christchurch and is believed to have originated as a seedling from a *Leptospermum* with white flowers, itself perhaps only a seedling form, known in New Zealand lists as *L. Chapmanii*. Whatever the precise nature of the form figured may be it is a valuable addition to horticulture, for it is quite hardy and is easily raised from cuttings, while plants so obtained flower when about a year old. The material for the plate was obtained from a plant grown at Kew under glass; when so treated it opens its flowers in April and remains in blossom for

about six weeks. The Kew experience is that in plants under glass the leaves are green; only in plants grown in the open does the foliage here assume a coppery tinge.

Olearia chathamica is another striking New Zealand plant for whose introduction, in 1908, horticulture is again indebted to Captain Dorrien-Smith. This handsome Composite is not, however, met with in New Zealand proper; it is confined to the Chatham Islands, a small group lying further to the east, where it grows in compact masses on the cliff edges or scattered about among the upland bogs, along with *O. semidentata*, another and it is said even more handsome member of the same genus. The material for the figure was supplied by the Rev. A. T. Boscawen, to whom it had been given by Capt. Dorrien-Smith and in whose garden at Ludgvan near Marazion it flowered in June, 1911. At Ludgvan it has proved quite hardy and is readily propagated by means of cuttings.

Crassula Barklyi is a curious small species which was first gathered in Little Namaqualand by the late Sir H. Barkly about 1875. The plants figured were, however, some which were presented to Kew in January, 1911, by Professor Pearson of Cape Town; they formed part of a collection made during the Percy Sladen Expedition, led by Professor Pearson, and were found by Mr. Pillans, one of the party, some little distance south-west of Bakhuis.

The Plums of New York.—A copy of this elaborate work,* published by the New York Agricultural Experiment Station, has been presented to the Library by Mr. W. P. Hedrich, who is already favourably known as the author of a similar volume dealing with the American species and varieties of *Vitis*, entitled "The Grapes of New York." The bulk of the present volume is taken up with descriptions of varieties of plums that can be grown in New York State, with notes on their origin, history, characteristics and cultivation. It is of quarto size, runs to 628 pages, and is illustrated by about one hundred finely executed, coloured portraits of the more important varieties of fruit and the flowering sprays of some American species of *Prunus*. The plums derived from the Old World *P. domestica*, L., are still by far the most important in North American gardens, especially in the longer settled States. But numerous varieties have been and are being raised by selection and hybridisation from the North American species. These are of peculiar interest and value because in many parts of the United States, like the Mississippi Valley, the prairie States, and the South generally, European plums will not thrive. The Chinese *Prunus triflora*, Roxb., is also playing an increasingly important part in the fruit industry of the United States, being nearly free from the fungoid pests that attack European varieties. Having been cultivated in the Far East for a long period, the plums of the *triflora* group are in size and quality much in advance of any of purely American derivation. The botanical part of the work is carefully and conscientiously done, and the book as a whole will no doubt long be regarded as the standard one on its subject in the United States.

* The Plums of New York: Report of the New York Agricultural Experiment Station for the year 1910: II. Albany: J. B. Lyon Company, State Printers: 1911.